No. 8254

JVC Service Manual

VIDEO CASSETTE RECORDER VHS PAL SECAM NTSC 4.43

MODEL BR-6400TR

VIDEO CASSETTE PLAYER

MODEL BP-5300TR

VICTOR COMPANY OF JAPAN, LIMITED

TABLE OF CONTENTS

Section Title Page

BR-6400U INSTRUCTIONS
BP-5300U INSTRUCTIONS

1. GENERAL DESCRIPTION .... 1 - 1
- 1 . 1 GENERAL OUTLINE .... 1 - 1

2. MECHANISM DESCRIPTION .... 2 - 1
- 2 . 1 GENERAL .... 2 - 1
- 2 . 2 MAIN COMPONENT OPERATIONS .... 2 - 1
  - 2 . 2 . 1 Motors .... 2 - 1
  - 2 . 2 . 2 Solenoids .... 2 - 2
  - 2 . 2 . 3 Cassette housing .... 2 - 2
- 2 . 3 MODE DESCRIPTIONS .... 2 - 3
  - 2 . 3 . 1 Stop mode .... 2 - 3
  - 2 . 3 . 2 Loading mode .... 2 - 4
  - 2 . 3 . 3 Unloading mode .... 2 - 5
  - 2 . 3 . 4 Play/Recording mode .... 2 - 6
  - 2 . 3 . 5 Still and Pause mode .... 2 - 6
  - 2 . 3 . 6 Forward (FWD) search mode .... 2 - 6
  - 2 . 3 . 7 Reverse (REV) search mode .... 2 - 7
  - 2 . 3 . 8 FF (fast forward) mode .... 2 - 8
  - 2 . 3 . 9 REW (rewind) mode .... 2 - 9

3. CIRCUIT DESCRIPTION .... 3 - 1
- 3 . 1 GENERAL .... 3 - 1
- 3 . 2 SYSTEM CONTROL CIRCUIT (SYSCON) .... 3 - 1
  - 3 . 2 . 1 General .... 3 - 1
  - 3 . 2 . 2 Block diagram description .... 3 - 1
  - 3 . 2 . 3 Major circuits connected to the system control board .... 3 - 2
  - 3 . 2 . 4 IC25 CPU specifications .... 3 - 3
  - 3 . 2 . 5 Process after power on .... 3 - 3
  - 3 . 2 . 6 General operation .... 3 - 4
  - 3 . 2 . 7 Warning conditions .... 3 - 5
  - 3 . 2 . 8 Connection with remote control .... 3 - 6
  - 3 . 2 . 9 Input/Output expanders .... 3 - 6
  - 3 . 2 . 10 Serial to parallel decoder circuit 3-11
  - 3 . 2 . 11 Tape loading motor drive circuit 3-12
  - 3 . 2 . 12 Tape remaining sensor 3-13
  - 3 . 2 . 13 Search speed control circuit 3-15
  - 3 . 2 . 14 Cassette motor drive circuit 3-17
  - 3 . 2 . 15 Operation-A circuit 3-19
  - 3 . 2 . 16 Counter circuit 3-20
  - 3 . 2 . 17 Junction circuit 3-20
  - 3 . 2 . 18 Tape end solenoid control circuit 3-22
  - 3 . 2 . 19 Long still (IC28, HA17555PS) 3-22
  - 3 . 2 . 20 Pause, Still and Pre-roll 3-22
  - 3 . 2 . 21 Drum stop detecting circuit 3-23
  - 3 . 2 . 22 Capstan stop detecting circuit 3-24
  - 3 . 2 . 23 System control block diagram 3-25
  - 3 . 2 . 24 System control timing chart 3-26
- 3 . 3 SERVO CIRCUIT 3-27
  - 3 . 3 . 1 Drum servo circuit 3-27
  - 3 . 3 . 2 Capstan servo circuit 3-35
  - 3 . 3 . 3 Reel servo system 3-44
- 3 . 4 VIDEO SYSTEM 3-53
  - 3 . 4 . 1 Outline 3-53
  - 3 . 4 . 2 Luminance signal recording system 3-53
  - 3 . 4 . 3 Luminance signal playback system 3-55
  - 3 . 4 . 4 Color signal recording system 3-59
  - 3 . 4 . 5 Color signal playback system 3-60
  - 3 . 4 . 4 PAL color signal system 3-59
  - 3 . 4 . 5 Color signal palyback system 3-60
  - 3 . 4 . 6 NTSC playback mode 3-63
  - 3 . 4 . 7 Chroma signal recording system 3-65
  - 3 . 4 . 8 Chroma signal playback system 3-65
  - 3 . 4 . 9 SECAM detector 3-66
- 3 . 5 AUDIO SYSTEM 3-68
  - 3 . 5 . 1 Recording system 3-68
  - 3 . 5 . 2 Playback system 3-69
  - 3 . 5 . 3 Audio dubbing system 3-69
  - 3 . 5 . 4 Audio playback E-E (AUD. PB. E-E) 3-70
  - 3 . 5 . 5 Crosstalk cancellation 3-70
  - 3 . 5 . 6 OSC block 3-70
  - 3 . 5 . 7 Erase heads selection circuit 3-71
  - 3 . 5 . 8 Limiter/limiter killer 3-72
  - 3 . 5 . 9 Pre-amplifier 3-72
  - 3 . 5 . 10 Mic amplifier muting 3-73
  - 3 . 5 . 11 Dolby circuit 3-73
  - 3 . 5 . 12 Muting control 3-74

4. MECHANICAL ADJUSTMENT .... 4 - 1
- 4 . 1 GENERAL .... 4 - 1
- 4 . 2 REQUIRED JIGS AND TOOLS .... 4 - 1
- 4 . 3 LAYOUT OF MAIN MECHANICAL PARTS .... 4 - 2
- 4 . 4 DISASSEMBLY .... 4 - 4
  - 4 . 4 . 1 Chassis removal .... 4 - 4
  - 4 . 4 . 2 Rear cover removal .... 4 - 4
  - 4 . 4 . 3 Front panel removal .... 4 - 4
  - 4 . 4 . 4 Color board .... 4 - 4
- 4 . 5 PERIODIC MAINTENANCE .... 4 - 5
  - 4 . 5 . 1 Cleaning .... 4 - 5
  - 4 . 5 . 2 Periodically replaced parts .... 4 - 5
- 4 . 6 MAIN ASSEMBLY REPLACEMENTS .... 4 - 6
  - 4 . 6 . 1 Cassette housing assembly .... 4 - 6
  - 4 . 6 . 2 Upper drum and brush assemblies/ commutator .... 4 - 6
  - 4 . 6 . 3 Lower drum assembly (Drum motor) .... 4 - 7
  - 4 . 6 . 4 Capstan motor assembly .... 4 - 8
  - 4 . 6 . 5 Supply reel motor .... 4 - 8
  - 4 . 6 . 6 Take-up reel motor .... 4 - 9
  - 4 . 6 . 7 Cassette housing motor .... 4 - 9

Section Title Page

4.6.8 Loading motor 4-9
4.6.9 Audio/control head subassembly 4-10
4.7 CHECKS AND ADJUSTMENT 4-11
4.7.1 Master plane jig setting 4-11
4.7.2 Reel disk height 4-11
4.7.3 Supply guide pole height 4-11
4.7.4 Tape guide height 4-12
4.7.5 Pinch roller 4-12
4.7.6 Differential transformer positioning 4-12
4.7.7 Pinch roller solenoid 4-12
4.7.8 Tape guide (Reverse) solenoid 4-13
4.7.9 Cassette switch height adjustment 4-13
4.7.10 Pulse generator (PG) head positioning 4-13
4.7.11 Torque 4-13
4.7.12 Upper drum eccentricity 4-14
4.8 TAPE TRANSPORT 4-16
4.8.1 Tape transport check 4-16
4.8.2 Tape transport adjustment 4-17
4.9 INTERCHANGEABILITY ADJUSTMENT 4-18
4.9.1 Preliminary checks 4-18
4.9.2 Preliminary adjustments 4-18
4.9.3 Fine adjustment 4-19
4.9.4 Audio/control head height 4-20
4.9.5 Audio/control head azimuth 4-20
4.9.6 Audio/control head position 4-20
4.9.7 Final checks 4-21

5. ELECTRICAL ADJUSTMENT 5-1
5.1 PREPARATION 5-1
5.1.1 Required test equipment and jig 5-1
5.1.2 JVC alignment tape contents 5-1
5.1.3 Check and Adjustment steps 5-3
5.2 POWER SUPPLY CIRCUIT 5-4
5.3 SYSTEM CONTROL (SYSCON) CIRCUIT 5-5
5.4 REEL SERVO CIRCUIT 5-6
5.5 DRUM SERVO CIRCUIT 5-8
5.6 CAPSTAN SERVO CIRCUIT 5-12
5.7 AUDIO CIRCUIT 5-14
5.8 VIDEO CIRCUIT 5-18

6. CHARTS AND DIAGRAMS 6-1
6.1 ELECTRICAL PARTS LOCATION 6-1
6.2 KEY TO ABBREVIATIONS 6-2
6.3 OVERALL WIRING : BR-6400TR 6-3
6.4 OVERALL WIRING : BP-5300TR 6-4
6.5 POWER SUPPLY SCHEMATIC DIAGRAM 6-5
6.6 POWER SUPPLY, TRANSISTER AND DIODE CIRCUIT BOARD (P.W.B) 6-5
6.7 OPERATION-A, JUNCTION, SYSTEM CONTROL, SYSTEM CONTROL SUB AND COUNTER CIRCUIT DIAGRAM 6-6
6.8 OPERATION-A, JUNCTION, SYSTEM CONTROL, SYSTEM CONTROL SUB AND COUNTER BOARDS 6-7
6.9 MOTHER, OPERATION-B, -C, -D, -E, RF CONVERTER AND ERAR CIRCUIT BOARDS 6-8

Section Title Page

6.10 DRUM SERVO SCHEMATIC DIAGRAM 6-8
6.11 DRUM SERVO CIRCUIT BOARD 6-9
6.12 CAPSTAN SERVO SCHEMATIC DIAGRAM ... 6-10
6.13 CAPSTAN SERVO CIRCUIT BOARD 6-11
6.14 REEL SERVO SCHEMATIC DIAGRAM 6-12
6.15 REEL SERVO CIRCUIT BOARD 6-13
6.16 LUMINANCE (Y) SCHEMATIC DIAGRAM 6-14
6.17 LUMINANCE (Y) CIRCUIT BOARD 6-15
6.18 PAL AND NTSC (P & N) COLOR CIRCUIT SCHEMATIC DIAGRAM 6-16
6.19 PAL AND NTSC (P & N) COLOR CIRCUIT BOARD 6-17
6.20 SECAM COLOR CIRCUIT SCHEMATIC DIAGRAM 6-18
6.21 SECAM COLOR CIRCUIT BOARD 6-19
6.22 PRE AND REC CIRCUIT SCHEMATIC DIAGRAM 6-20
6.23 PRE AND REC CIRCUIT BOARD 6-21
6.24 AUDIO CIRCUIT SCHEMATIC DIAGRAM 6-22
6.25 AUDIO CIRCUIT BOARD 6-23

7. EXPLODED VIEWS AND PARTS LIST 7-1
7.1 GENERAL RULES FOR NUMBERING METHOD OF SCREW/WASHER/E-RING 7-1
7.2 MAIN PARTS LOCATION 7-2
7.3 REPACKING AND ACCESSORIES 7-3
7.4 CABINET ASSEMBLY 7-4
7.5 CHASSIS ASSEMBLY 7-6
7.6 MOUNTING BASE ASSEMBLY 7-8
7.7 REAR FRAME ASSEMBLY 7-10
7.8 MAIN DECK-1 ASSEMBLY 7-12
7.9 MAIN DECK-2 ASSEMBLY 7-14
7.10 SUB DECK ASSEMBLY 7-16
7.11 DRUM ASSEMBLY 7-18
7.12 CASSETTE HOUSING ASSEMBLY 7-20

8. ELECTRICAL PARTS LIST 8-1
8.1 SAFETY PRECAUTION 8-1
8.2 FIXED RESISTOR CODING 8-1
8.2.1 Shape of resistor 8-1
8.3 FIXED CAPACITOR CODING 8-2
8.3.1 Rated voltage 8-3
8.3.2 Tolerance 8-3
8.3.3 Values 8-3
8.4 FUSE CODING 8-4
8.5 ELECTRICAL PARTS LIST BY ASSEMBLY 8-5
8.5.1 PAL & NTSC color amp. circuit board ass'y 10 8-5
8.5.2 Luminance (Y) amp. circuit board ass'y 11 8-8
8.5.3 Pre & Rec circuit board ass'y 13 8-11
8.5.4 Head select circuit board ass'y 15 8-14
8.5.5 SECAM color amp. circuit board ass'y 16 8-15
8.5.6 Reel servo circuit board ass.y 20 8-17

Section	Title		Page
8.5.7	Capstan servo circuit board ass'y	21	8-20
8.5.8	Drum servo circuit board ass'y	22	8-24
8.5.9	Mother circuit board ass'y	23	8-27
8.5.10	System control circuit board ass'y	30	8-27
8.5.11	Junction circuit board ass'y	33	8-30
8.5.12	Counter circuit board ass'y	34	8-31
8.5.13	Audio circuit board ass'y	40	8-32
8.5.14	Operation-A circuit board ass'y	35	8-36
8.5.15	Operation-B circuit board ass'y	44	8-37
8.5.16	Operation-C circuit board ass'y	43	8-37
8.5.17	Operation-D circuit board ass'y	36	8-37
8.5.18	Operation-E circuit board ass'y	45	8-37
8.5.19	Rear circuit board ass'y	47	8-37
8.5.20	Power diode circuit board-1	52	8-38
8.5.21	Power diode circuit board-2	53	8-38
8.5.22	Power transistor circuit board ass'y	54	8-38
8.5.23	RF converter mount board ass'y	57	8-39
8.5.24	System control sub board ass'y	65	8-39
8.5.25	Power supply board ass'y	70	8-40

Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▒) parts are critical for safety.
   Replace only with specified part numbers.
   Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Fuse replacement caution notice.
   Caution for continued protection against fire hazard.
   Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors
   5) Barrier

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

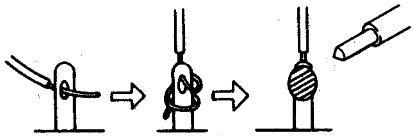


Fig. 1

7. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10–15 kg of force in any direction will not loosen it.

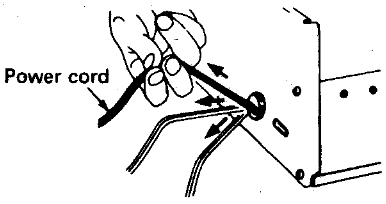


Fig. 2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.
    1) **Connector part number** : E03830-001
    2) **Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.
    3) **Replacement procedure**
       (1) Remove the old connector by cutting the wires at a point close to the connector.
       Important : Do not reuse a connector (discard it).

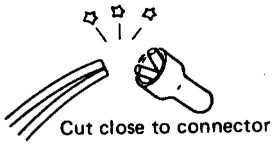


Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

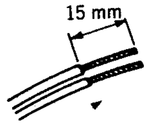


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

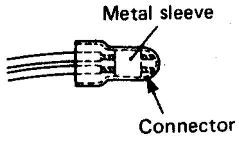


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

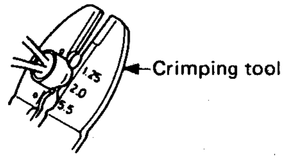


Fig. 6

(5) Check the four points noted in Fig. 7.

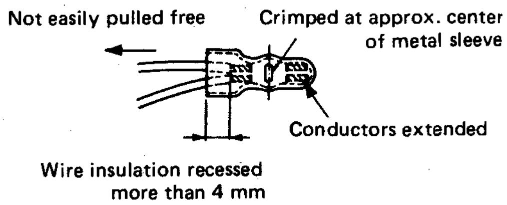

Not easily pulled free
Crimped at approx. center of metal sleeve
Conductors extended
Wire insulation recessed more than 4 mm

Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions, Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

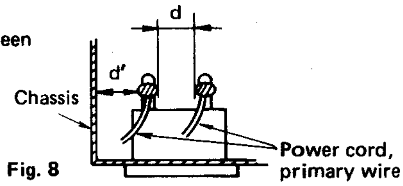


Fig. 8

4. **Leakage current test**
   Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).
   Measuring Method: (Power ON)
   Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

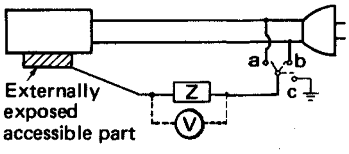


Fig. 9

5. **Grounding (Class I model only)**
   Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).
   Measuring Method:
   Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

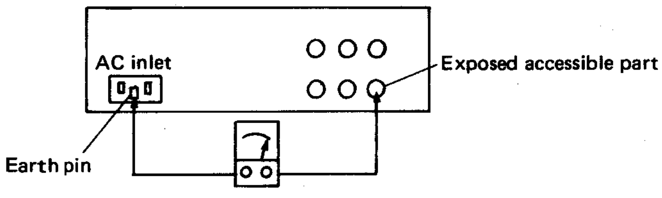


Fig. 10

Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	Z ≦ 0.1 ohm
Europe & Australia	Z ≦ 0.5 ohm

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	R ≧ 1 MΩ/500 V DC	AC 1 kV 1 minute	d, d' ≧ 3 mm
100 to 240 V			AC 1.5 kV 1 minute	d, d' ≧ 4 mm
110 to 130 V	USA & Canada	–	AC 900 V 1 minute	d, d' ≧ 3.2 mm
110 to 130 V 200 to 240 V	Europe & Australia	R ≧ 10 MΩ /500 V DC	AC 3 kV 1 minute (Class II) AC 1.5 kV 1 minute (Class I)	d ≧ 4 mm d' ≧ 8 mm (Power cord) d' ≧ 6 mm (Primary wire)

Table 1 Specifications for each region

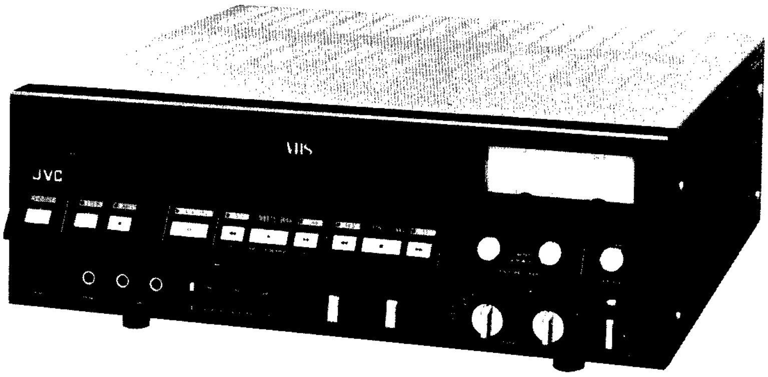
AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan	1 kΩ	i ≦ 1 mA rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 µF 1.5 kΩ	i ≦ 0.5 mA rms	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia	2 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Other terminals

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

No. 8254

JVC Service Manual



MODEL BR-6400TR

MODEL BP-5300TR

VICTOR COMPANY OF JAPAN, LIMITED

COPYRIGHT © 1982 VICTOR COMPANY OF JAPAN, LTD.

Printed in Japan

BR-6400TR

INSTRUCTIONS
MANUEL D'INSTRUCTIONS
BEDIENUNGSANLEITUNG

For reference, the text of the instruction booklet of this model is reproduced in the following pages.
Numbering of the pages also corresponds with that of the booklet.

BR-6400TR
COLOR VIDEO CASSETTE RECORDER

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

WARNING–DANGEROUS VOLTAGE INSIDE

CAUTION

Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial, prior to replacing the fuse, and prior to altering the voltage setting.

POWER SYSTEM

Connection to the mains supply

The operating voltage of this set is preset to 240 V∿ at the factory.

Before connecting to mains, check that the voltage selector on the rear panel is set to the same voltage as your local mains supply.

Adapting to local power line

This set operates on either 100, 120, 220 or 240 V∿.

If the preset voltage is different from the power line voltage in your area, reset the voltage selector by inserting a screwdriver into the slot of the voltage selector and turning it until the correct voltage is displayed.

Warning Notice

FOR YOUR SAFETY (Australia)

1. Insert this plug only into effectively earthed three-pin power outlet.
2. If any doubt exists regarding the earthing, consult a qualified electrician.
3. Extension cords, if used, must be three-core correctly wired.

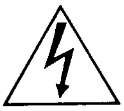
NOTE:

The rating plate (serial number plate) and the safety caution are on the rear of the unit.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK.
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



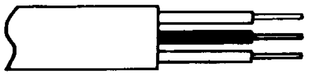
The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

IMPORTANT (In the United Kingdom) Mains Supply (AC 240 V∿, 50 Hz only)

WARNING – THIS APPARATUS MUST BE EARTHED

The wires in this mains lead are coloured in accordance with the following code:



As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows. The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the safety earth symbol ⏚ or coloured GREEN or GREEN-AND-YELLOW. The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or which is coloured BLACK. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

IMPORTANT: It is permissible to record television programmes only in the event that third party copyrights and other rights are not violated.

Warning to US purchasers:

The unauthorized recording of copyrighted broadcast programming for commercial purposes is copyright infringement.

Warning to UK purchasers:

Recording and playback of material may require consent. See copyright Act 1956 and Performers Protection Act 1958 – 1972.

CONTENTS

Precautions 2
Features 3
Controls and connectors 4
Connections 7
RF converter installation 10
Loading and unloading the video cassette 10
Playback 11
Recording 11
Audio dubbing 12
Convenient facilities 13
In case of difficulty 13
Specifications 14

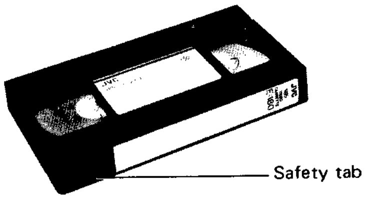
PRECAUTIONS

Handling and storage

- Avoid using the BR-6400TR under the following conditions:
  - extremely hot, cold or humid places,
  - dusty places,
  - near appliances generating strong magnetic fields,
  - places subject to vibration, and
  - poorly ventilated places.
- Be careful of moisture condensation.
  Avoid using the BR-6400TR soon after moving from a cold place to a warm place or soon after heating a room which was cold. Water vapor in the warm air will condense on the still-cold video head drum and tape guides and this moisture may cause damage to the tape and the recorder.
- Handle the BR-6400TR carefully.
  - Do not block the ventilation openings.
  - Do not place anything heavy on the recorder.
  - Do not place anything which might spill and cause internal damage on top of the recorder.
  - Use in horizontal (flat) position only.
- In case of transportation,
  - Avoid violent shocks to the recorder during packing and transportation.
  - Before packing, be sure to remove the cassette from the recorder.

Video cassettes

- The BR-6400TR employs VHS type cassettes only.
  E-type cassettes for PAL/SECAM recording and playback.
  T-type NTSC tapes can also be played back.
- Video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has already been removed, use adhesive tape to block the hole.
- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or a magnet) and dusty places.
- Place the cassettes in cassette cases and position vertically.



CAUTION
If for some reason it becomes necessary for you to turn the POWER switch to ON after having switched it OFF, do not do so immediately. Allow a period longer than 2 seconds to elapse, otherwise it might happen that the cassette will be ejected or the unit becomes inoperative with the POWER LED indicator flashing. If this happens, set the POWER switch to OFF and, after a period longer than 2 seconds, set the POWER switch once again to ON.

CAUTION
It may be necessary to periodically check this video cassette recorder depending on how you use it. If required, consult a JVC service dealer.

VHS

Only cassettes marked "VHS" can be used with this video cassette recorder.

COPYRIGHT © 1982 VICTOR COMPANY OF JAPAN, LTD.

FEATURES

Dual-system recording/Triple-system playback
For flexibility, the BR-6400TR can record PAL and SECAM signals and play back PAL, SECAM and 4.43 MHz NTSC signals.

Direct drive system
The head drum is directly driven by a servo-controlled brushless DC motor, while the capstan and reels are all driven directly by independent DC motors, assuring minimal jitter, stable pictures and more reliable operation.

Aluminum diecast chassis for heavy-duty use
Rugged and durable aluminum diecast chassis supports the long-term and demanding use of the BR-6400TR for institutional applications.

Motorized automatic front cassette loading
Simply insert a video cassette slightly into the front panel slot and the loading motor moves the cassette automatically and quietly so that it is properly positioned for operation.

4-head system
The BR-6400TR uses two pairs of video heads, one pair for recording and normal playback and the other for slow-motion, still picture and search playback. As well as achieving high-quality recording and playback, this results in stable still, slow and fast playback.

Microprocessor-based full-logic control
As well as allowing feather-light touch operation and direct mode change, full remote control of all operational modes is also possible.

Shuttle search at 10 times normal speed
Run the tape at a speed about 10 times normal in either direction to locate the scene you wish to view fast and accurately.

Variable-speed playback from still to 5 times normal
When the BR-6400TR is controlled from an appropriate remote control unit, the tape playback speed can be varied continuously from still to 5 times normal in both forward and reverse directions.

Capstan servo and external sync capability
Since it incorporates a capstan servo and accommodates external reference signals to which its playback can be locked, the BR-6400TR can adapt well to any existing video system.

Two-channel audio system
Two audio tracks enable bilingual presentations.

Audio level control with meters
To prevent over-level recordings, an audio limiter circuit is built in for each of the two audio channels. Depending on situations, these audio limiter circuits can be switched on or off. In either condition, manual level control referring to the meters is also possible.

Tracking meter
The channel-2 audio level meter can be switched into a tracking meter so that precise tracking alignments can be made for critical playback.

Selectable audio dubbing
Audio dubbing can be performed on either of the two audio channels.

Hi-Fi sound reproduction
The advanced audio circuit ensures excellent sound reproduction, that's also supported by the built-in Dolby* noise reduction system, allowing high-fidelity listening pleasure, too.

Flexible search and repeat functions
Counter search, full repeat, counter repeat and automatic rewind at tape end are all provided.

Automatic back-space editing control
Makes edits virtually "undetectable".

Electronic tape counter/lap time indicator
The built-in 4-digit tape counter doubles as a 5-digit lap time counter by switching it.

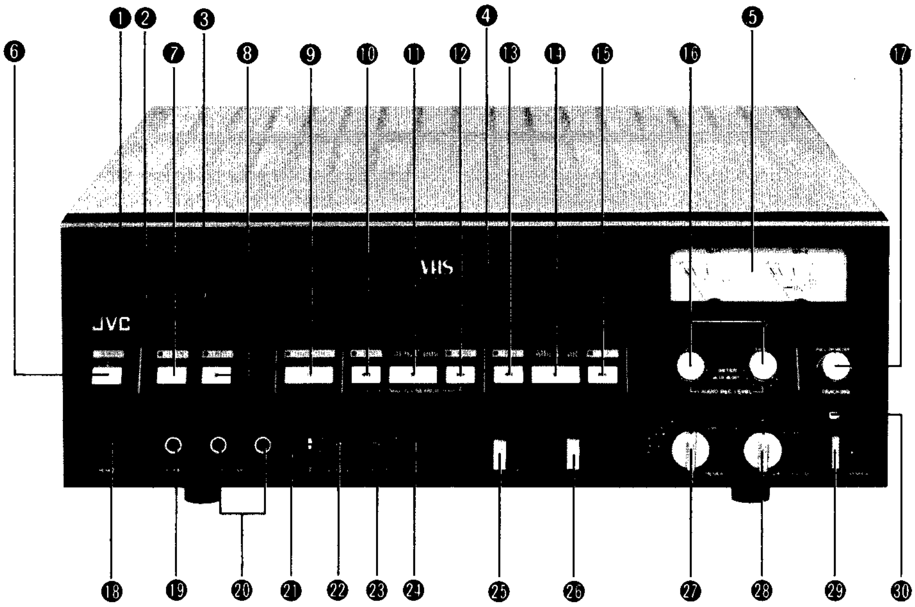
Tape-end warning
The fluorescent display functions as a tape-end warning indicator in the Record mode by flashing during the final 5 to 10 minutes of tape run. (This time span slightly differs between tapes.)

Optional remote control units
A choice of compact remote control units are available; a wireless remote control unit and a connectable remote control unit.

Editing control interfacing
For more elaborate editing, direct interfacing with JVC's Automatic Editing Control Unit is possible, enabling 1/2"-to-3/4" edits to be made quickly and accurately.

CONTROLS AND CONNECTORS

Front panel



① Electronic tape counter/Lap time counter/Tape-end warning indicator
This fluorescent display functions as a 4-digit tape counter or a 5-digit lap time indicator depending on the setting of the display mode select switch ② . In either mode, the display starts flashing 5 to 10 minutes before the tape end during recording. While the tape is being wound in the forward direction, the counter reading advances in the direction of increasing numbers. While the tape is being wound in the reverse direction, the counter reading changes in the direction of decreasing numbers and after zoero a "minus" sign appears.

② Display mode select button (TAPE/LAP)
The fluorescent display functions as a tape counter with this button in its "out" position. When the button is pressed in, the display changes into a lap time counter.

To change back to the tape counter, press the button once again.

TAPE: Counting up to ±9999.

LAP: Counting up to ±9 hours, 59 minutes, 59 seconds.

③ Counter reset button (RESET)
Press to reset the tape or lap time counter to zero.

④ Cassette loading slot
With the POWER switch set to ON, insert a video cassette with its labelled edge facing toward you. The cassette carriage itself will automatically take control and retract the cassette into the correct loaded position.

⑤ Audio level meters/Tracking meter
These meters indicate the audio level during recording and playback. The CH-2 meter is switched to a tracking meter when the TRACKING control/Meter function select switch ⑰ is pulled to its "out" position.

⑥ EJECT button
Press to eject the cassette. This button can be pressed in the Stop mode or immediately after the STOP button has been pressed. The EJECT indicator will be flashing during automatic unloading of the cassette and then remain lit upon completion of ejection.

⑦ Audio dubbing button (A. DUB)
Press together with the PLAY button ⑪ to record audio on a pre-recorded tape. The channel on which new audio is to be recorded can be selected by the AUDIO DUB switch ㉓ . During audio dubbing, the A. DUB and PLAY indicators light. (The PLAY indicator flickers first until tape loading is completed.)

- Before starting audio dubbing, make sure that the AUDIO DUB switch ㉓ has been correctly set.

⑧ Record button (REC)
Press together with the PLAY button ⑪ for video and audio recording. Audio is recorded on both channels, if there are input signals for them. The REC and PLAY indicators light during recording. (The PLAY indicator flickers first until tape loading is completed.)

⑨ PAUSE/STILL button
Press to stop the tape temporarily. When this button is pressed during playback or shuttle search, a still picture appears immediately with the PAUSE/STILL indicator lighting. When this button is pressed during recording, the tape is back-spaced (pre-rolled) for approx. 2 seconds of program time and stops in the Pause mode. While pre-rolling, the PAUSE/STILL indicator flashes and then, upon completion of pre-rolling, it remains lit. The Pause or Still mode is released by pressing the PLAY button ⑪ .

⑩ Reverse search button (REV) – (Shuttle search)
Pressing this button in the Play or Still mode enables high-speed playback at about 10 times normal in the reverse direction. During search, the REV indicator will light. To release this search mode, press the PLAY, FF, REW, PAUSE/STILL, STOP or FWD button depending on the mode you want to select next.

⑪ PLAY button
When this button is pressed, the tape is loaded around the tape transport mechanism and the Play mode is engaged. During loading, the PLAY indicator will flash and, after completion of loading, it will remain lit continually during the Play mode. Press this button together with the REC button ⑧ for recording and with the A. DUB button ⑦ for audio dubbing.

⑫ **Forward search button (FWD) – (Shuttle search)**
Pressing this button in the Play or Still mode enables high-speed playback at about 10 times normal in the forward direction. During search, the FWD indicator will light. To release this search mode, press the PLAY, FF, REW, PAUSE/STILL, STOP or REV button depending on the mode you want to select next.

⑬ **Rewind button (REW)**
Press to rewind the tape inside the cassette. While the tape is being rewound, the REW indicator will light. This button can be pressed in any mode except Record, Audio Dub or Eject. To release the Rewind mode, press the PLAY, STOP or FF button depending on the mode you want to select next.

⑭ **STOP button**
Press to unload and stop the tape. This button has priority over all other buttons. During unloading of the tape into the cassette, the STOP indicator will flash and, after unloading, it will remain lit.

⑮ **Fast forward button (FF)**
Press to fast forward the tape inside the cassette. While the tape is being fast forwarded, the FF indicator will light. This button can be pressed in any mode except Record, Audio Dub or Eject. To release the Fast Forward mode, press the PLAY, STOP or REW button depending on the mode you want to select next.

⑯ **Audio recording level controls/Limiter switches (AUDIO REC LEVEL/LIMIT CH-1, CH-2)**
When the knobs are pulled outward, the built-in audio limiter circuits are switched off. If you want to activate the audio limiter circuits to prevent over-level recordings, leave the knobs in their "in" position. In either position of the knobs, turning them enables recording level adjustment.

⑰ **Tracking control/Meter function select switch (TRACKING)**
If noise bars appear on the screen, adjust tracking by using this control. First pull the knob outward to switch the CH-2 audio level meter to a tracking meter and turn the knob so that the meter needle makes its maximum deflection to the right.

⑱ **7-pin remote control terminal (REMOTE) (7-pin DIN)**
A JVC exclusive remote control unit may be connected to this terminal. A wireless remote control unit is also available from JVC. When using the wireless remote control unit, this terminal accepts a receiver which is supplied with the remote control unit.

⑲ **Headphone jack (PHONES) (6 mmϕ)**
Connect a set of stereo headphones having an impedance of 8 – 300 ohms. The audio channel selected by the AUDIO MONITOR switch ㉕ can be listened to. The output level is switchable among low, normal and high by the rear panel PHONES LEVEL switch ㊺ .

⑳ **Microphone jacks (MIC CH-1, CH-2) (6 mmϕ)**
Connect microphone having an impedance of 600 ohms and a sensitivity of -70 to -60 dBm. If audio signals are applied also to the rear panel AUDIO IN connectors ㊷ , both inputs are mixed and recorded.

㉑ **Audio noise reduction indicator (NR INDICATOR)**
This LED lights when the AUDIO NR switch ㉒ is set to ON.

㉒ **Audio noise reduction switch (AUDIO NR)**
Set to ON to activate the built-in Dolby* noise reduction system to reduce tape hiss.

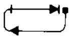
㉓ **Audio dubbing channel select switch (AUDIO DUB)**
Set to CH-1 when you want to record new audio on channel-1 and to CH-2 for channel-2 audio dubbing.

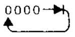
㉔ **INPUT select switch**
TV: Set to this position when you record input signals from the 8-pin TV connector. The sound will be recorded onto channel-1.
LINE: Set to this position when you record input signals from the VIDEO IN and AUDIO IN (CH-1, CH-2) connectors or from the MIC (CH-1, CH-2) jacks.

㉕ **AUDIO MONITOR output select switch**
This switch selects the audio output available at the 8-pin TV connector ㊱ , headphone jack ⑲ or AUDIO MONITOR connector ㊹ .
CH-1: To hear channel-1 audio.
CH-2: To hear channel-2 audio.
MIX: To hear both channel-1 and channel-2 audio together.

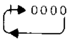
㉖ **VIDEO MODE select switch**
COLOUR: Set to this position when the input or playback video signal is in color.
AUTO. The circuit is automatically switched for color and black/white by detecting the color burst signal. This position is sufficient for most purposes.
B/W: Set to this position when the input or playback video signal is monochrome. Both the input and output signals are forcibly rendered black/white.

㉗ **Tape MEMORY switch**
Automatic repeat playback of specific sections on the tape or automatic search to the counter reading of "0", etc. is possible.
SEARCH: The tape stops at the counter reading of "0000" during FF or REW mode.
OFF : Set to this position when you are not using any of these memory functions.


: The tape will be automatically rewound at its end (as usual) and played back repeatedly when it reaches its beginning. The entire tape can be played back again and again automatically.



: In this position, repeated playback from the counter reading of "0000" to the tape end is possible.



: In this position, repeated playback from the beginning of the tape to the counter reading of "0000" is possible.

Note:
The marks for switch positions indicate a 4-digit figure (0000). However, the actual counter indication for zero is a 1-digit figure (0).

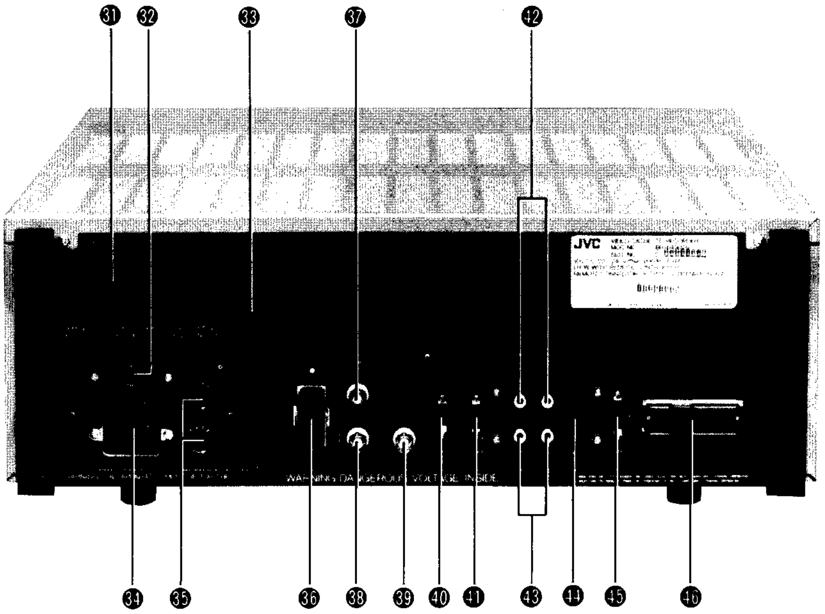
㉘ **VIDEO SYSTEM select switch**
SECAM: Set to this position when you are going to record or play back SECAM signals.
PAL: Set to this position when you are going to record or play back PAL signals.
MODIFIED NTSC (PLAYBACK): Set to this position when you are going to play back NTSC tapes. (A TV monitor with built-in 4.43 MHz NTSC decoder is necessary.)

㉙ POWER switch

㉚ POWER (and warning) indicator
This LED lights when power is on. If the tape running is in some way incorrect, this indicator starts flashing.
The causes may be:
(1) the moisture condensation sensor is in operation,
(2) the tape-end sensor lamp has blown out,
(3) the head drum does not rotate,
(4) the eject mechanism does not operate properly,
(5) the automatic loading and unloading mechanism does not operate properly, or
(6) the tape stops running.

The indicator flashes at a rate of about twice per second in the case of (1) and about once per second in the other five cases.

Rear panel



㉛ RF converter compartment

㉜ Voltage selector
Set to the power supply voltage in your area. See page 1.

㉝ RF output connector (RF OUT)
Connect to the antenna terminal of a TV receiver through the aerial cable and an antenna selector.

㉞ AC input socket

㉟ Fuse holders

㊱ TV monitor connector (TV) (8-pin)
This is an 8-pin input/output connector for the connection of a TV monitor. The audio signal selected by the AUDIO MONITOR switch ㉕ is present at the audio output terminal.

㊲ Video line input connector (VIDEO IN) (BNC-type)
Line input connector for the video signal.

㊳ Video line output connector (VIDEO OUT) (BNC-type)
Line output connector for the video signal.

㊴ External sync signal input connector (SYNC IN) (BNC-type)
This is an input connector to accept an external reference sync signal when the recorder is to be operated in the external sync mode. The external sync signal can be a composite sync signal or composite video signal.

㊵ Playback sync select switch (PB SYNC)
Set to EXT when the playback is to be locked to an external sync signal.

㊶ Audio input level select switch (AUDIO INPUT LEVEL)
Select either -6 dB or -20 dB according to the level of the audio signal applied to the AUDIO IN connectors. The level is switched for both audio channels simultaneously.

㊷ Audio line input connectors (AUDIO IN CH-1, CH-2) (RCA-type)
Line input connectors for the audio signal of channel-1 and channel-2.

㊸ Audio line output connectors (AUDIO OUT CH-1, CH-2) (RCA-type)
Line output connectors for the audio signals of channel-1 and channel-2.

㊹ Audio monitor output connector (AUDIO MONITOR) (DIN 5-pin)
The audio signal selected by the AUDIO MONITOR switch ㉕ is available.

㊺ Headphone level select switch (PHONES LEVEL)
The output level of the headphone jack ⑲ can be selected in three steps (HIGH, MED, LOW).

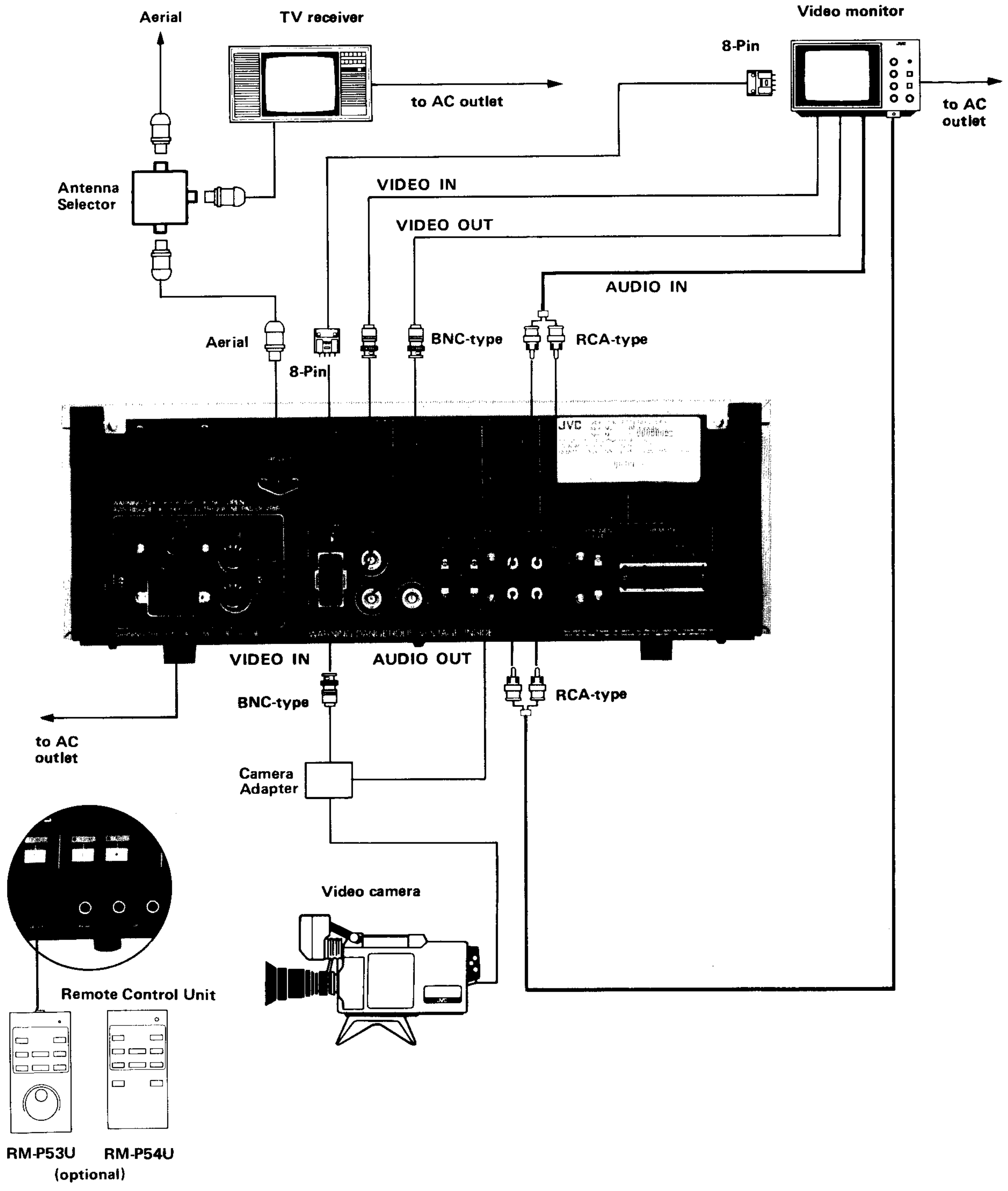
㊻ Remote control connector (REMOTE) (45-pin)
Connect a JVC remote control unit.

---

*Dolby is a trademark of Dolby Laboratories Licencing Corporation

CONNECTION

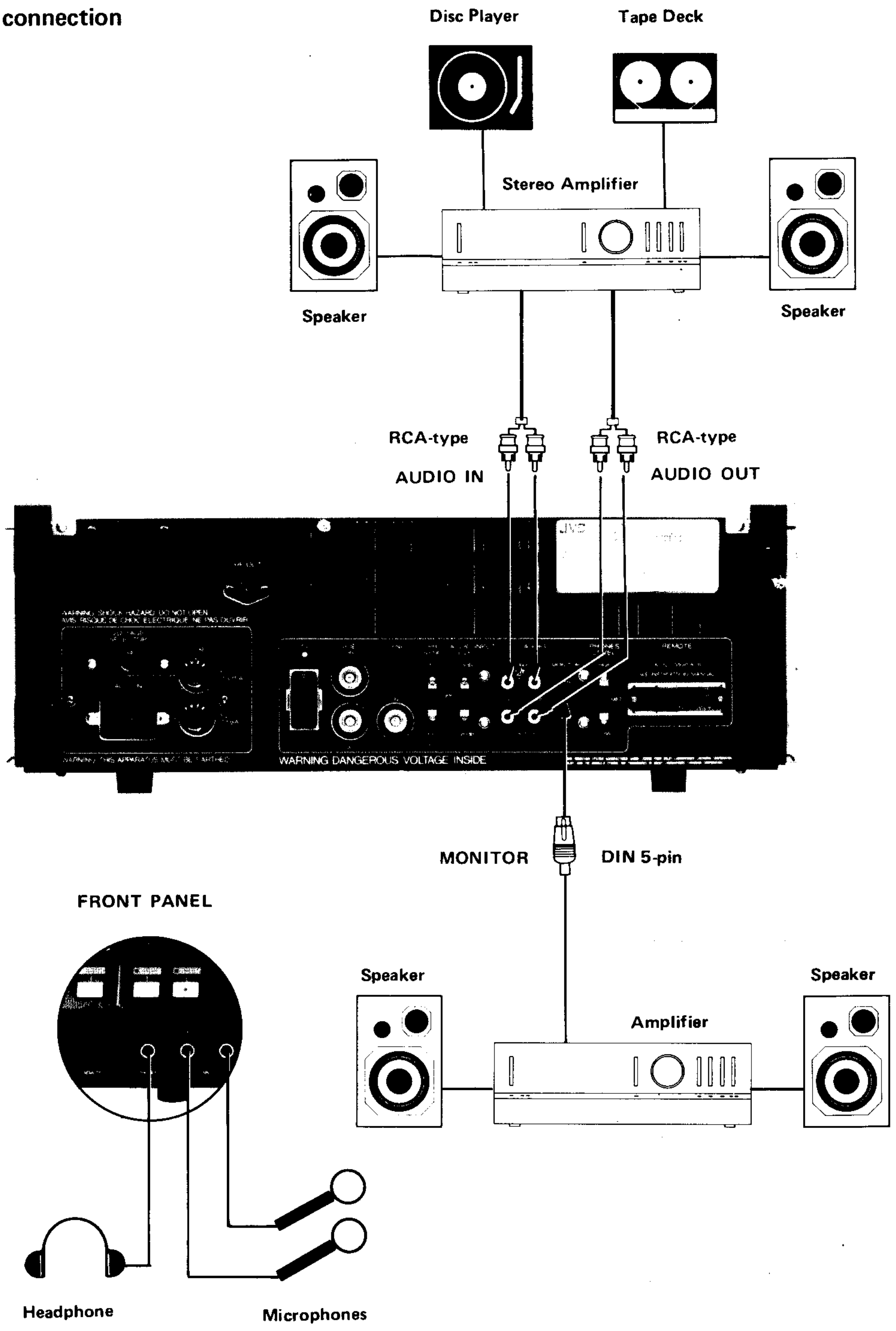
Video equipment connection


Aerial
TV receiver
Video monitor
8-Pin
to AC outlet
to AC outlet
Antenna Selector
VIDEO IN
VIDEO OUT
AUDIO IN
Aerial
8-Pin
BNC-type
RCA-type
JVC
VIDEO IN
AUDIO OUT
BNC-type
RCA-type
to AC outlet
Camera Adapter
Video camera
Remote Control Unit
RM-P53U
RM-P54U
(optional)

Notes:

- To record signals through the VIDEO IN connector, set the INPUT SELECT switch to LINE.
- To record signals from a TV monitor through the 8-pin TV monitor connector, set the INPUT SELECT switch to TV. In this case, the audio signal is recorded on the channel-1 track.

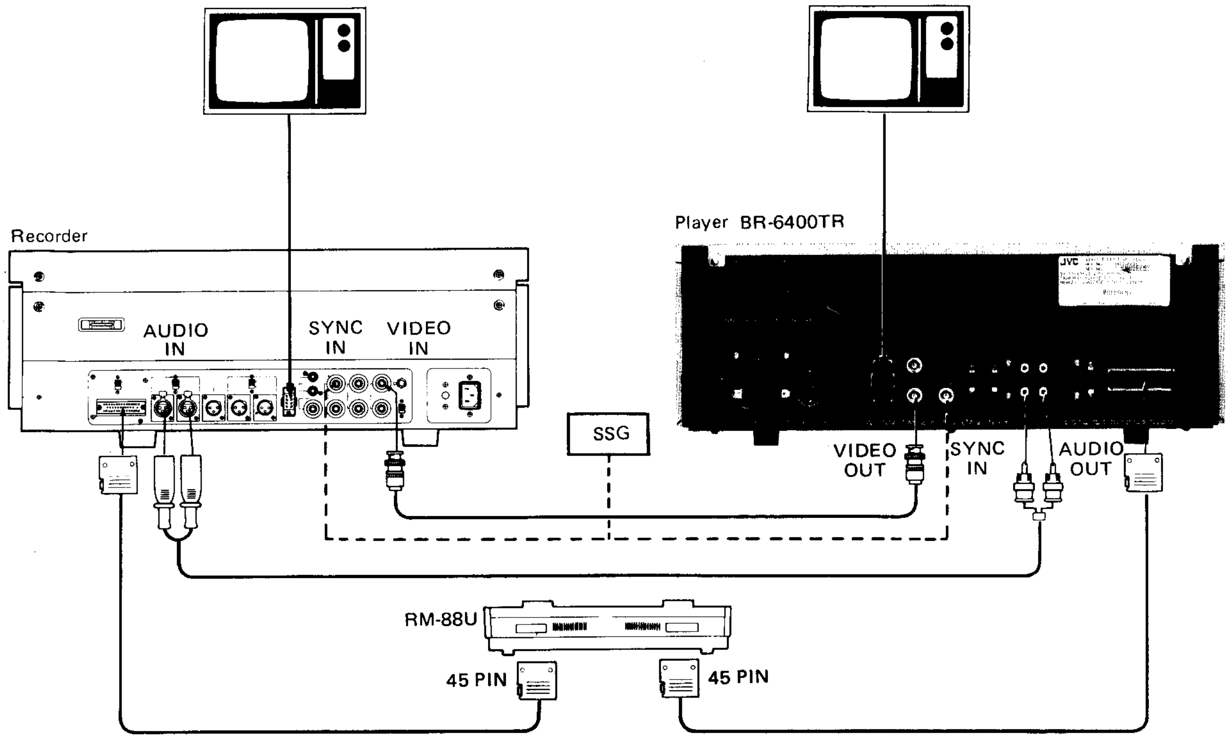
Audio equipment connection


Disc Player
Tape Deck
Stereo Amplifier
Speaker
Speaker
RCA-type
AUDIO IN
RCA-type
AUDIO OUT
WARNING DANGEROUS VOLTAGE INSIDE
MONITOR
DIN 5-pin
FRONT PANEL
Speaker
Speaker
Amplifier
Headphone
Microphones

Notes:

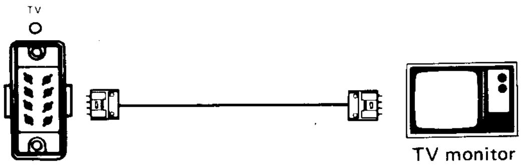
- Select either -6 dB or -20 dB with the AUDIO LEVEL select switch depending on the connected audio units.
- When microphones are plugged into the front panel microphone jacks, the microphone circuit is automatically put in line and the mixture of the microphone and line inputs is recorded.

Editing Connection

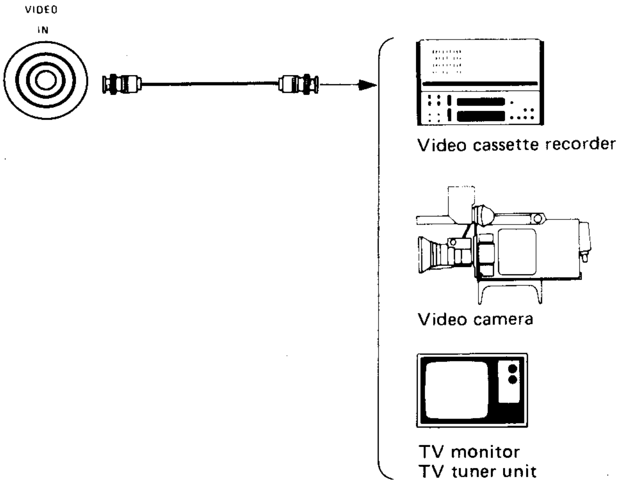

Recorder
AUDIO IN
SYNC IN
VIDEO IN
Player BR-6400TR
SSG
VIDEO OUT
SYNC IN
AUDIO OUT
RM-88U
45 PIN
45 PIN

Note:
When the BR-6400TR is to be used as a player in an editing system using the RM-88U Editing Control Unit, start editing after the beginning section of about 10 seconds of the tape has passed.

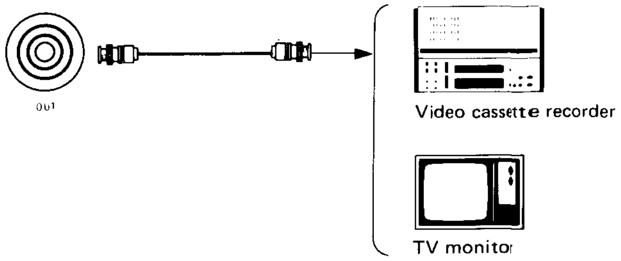
1. TV connector (8-pin)


TV
TV monitor

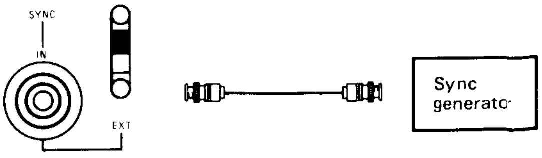
2. VIDEO IN connector (BNC)


VIDEO IN
Video cassette recorder
Video camera
TV monitor
TV tuner unit

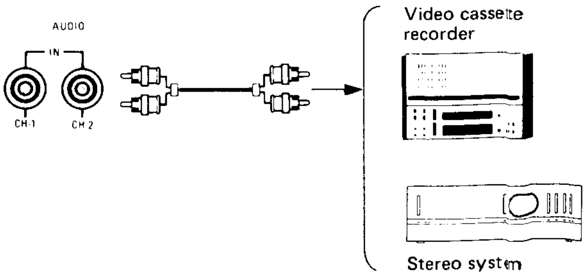
3. VIDEO OUT connector (BNC)


OUT
Video cassette recorder
TV monitor

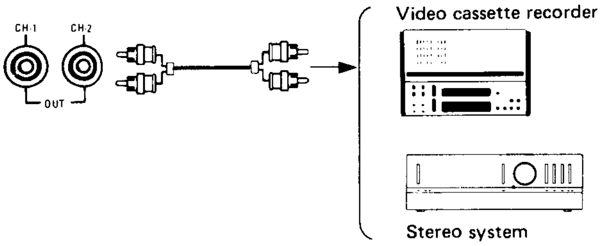
4. SYNC IN connector (BNC)


SYNC
IN
EXT
Sync generator

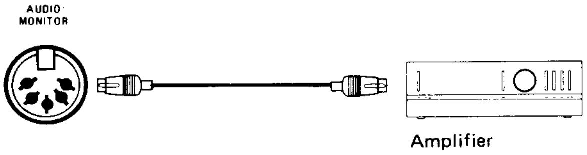
5. AUDIO IN (RCA)


AUDIO
IN
CH 1
CH 2
Video cassette recorder
Stereo system

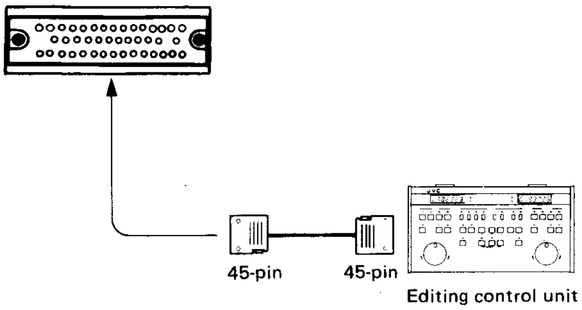
6. AUDIO OUT connector (RCA)



7. AUDIO MONITOR (DIN)



8. REMOTE control connector (45-pin)



RF CONVERTER INSTALLATION

- If it is necessary to install an RF converter (optional), remove the RF converter compartment cover by loosening the two screws. For an appropriate RF converter model, consult a JVC dealer.

We recommend to use an appropriate RF converter having one of the specified part numbers below:

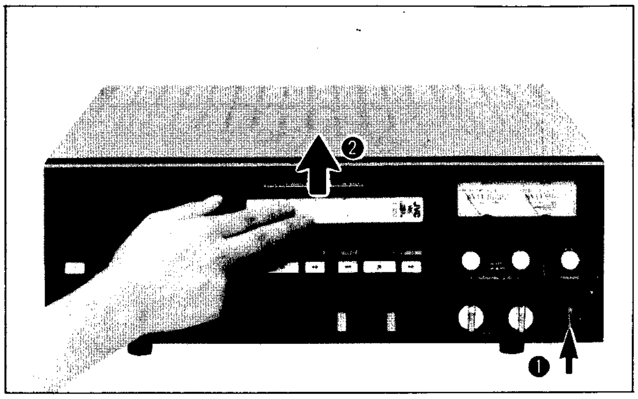
PU54120 for PAL system G
PU54121 for PAL system I
PU54122 for SECAM system L
PU54123 in Australia

Note:
When using this video recorder in areas covered by regulations regarding electromagnetic waves, it is not permitted for RF converters other than those listed above to be employed.

LOADING AND UNLOADING THE VIDEO CASSETTE

Loading

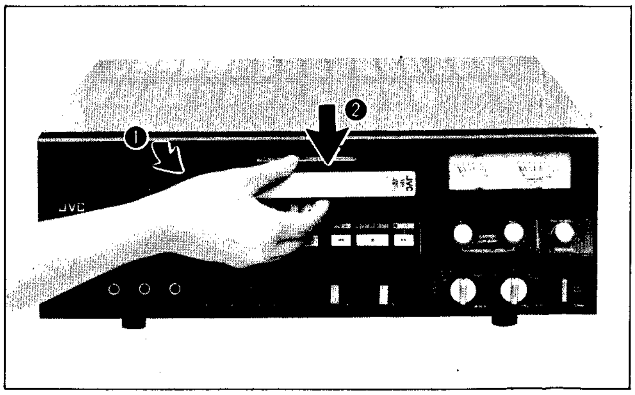
❶ Press the POWER switch to ON. The EJECT indicator will flash.



❷ After the EJECT indicator stops flashing and remains lit, insert a cassette with its labelled side facing you. The cassette will automatically be retracted and loaded in the correct position.
- The STOP indicator will be flashing during automatic loading of the cassette and, when it has been correctly loaded, will remain lit.
- The automatic loading mechanism will operate only when the cassette is inserted correctly.
- If loading does not result in positioning the cassette correctly, it will automatically be ejected after about 6 seconds.

Unloading

❶ Press the EJECT button in the Stop mode. The cassette will automatically be ejected.



❷ Remove the cassette from the cassette loading slot.
- The EJECT indicator will be flashing during automatic unloading of the cassette and then remains lit upon completion of ejection.
- The EJECT button can be pressed immediately after the STOP button has been pressed. The logic circuit will memorize the sequence; first engaging the recorder in the Stop mode and then automatically changing it into the Eject mode.

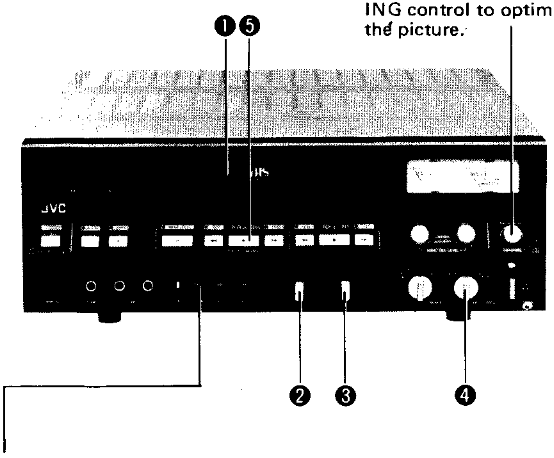
PLAYBACK

Normal playback

❶ Load a recorded cassette.

❷ Set the AUDIO MONITOR switch as required.

If noise bars appear on the screen, adjust the TRACKING control to optimize the picture.

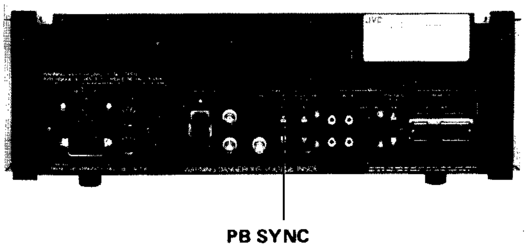


Set to the AUDIO NR switch to ON, if you play back tapes recorded with the AUDIO NR switch set to ON.

❸ Set the VIDEO MODE switch as required.

❹ Set the VIDEO SYSTEM switch as required.

❺ Press the PLAY button to start playback. The tape is first loaded onto the tape transport mechanism and then playback begins. During tape loading, the PLAY indicator is flashing and, after completion of loading, remains lit.



PB SYNC
Set to EXT when the playback is to be locked to an external sync signal. (Use a composite sync signal or a composite video signal as the reference sync signal.)

Notes:

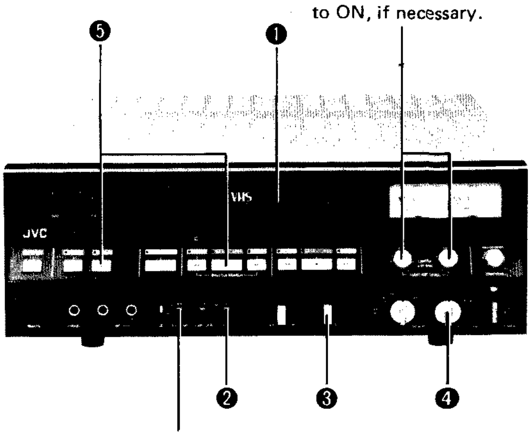
- If you wish to monitor the signal applied to the input connector during playback, press the REC button in the Play mode. The input signal will appear on the monitor screen. Do not press both the REC and PLAY buttons simultaneously, otherwise, the unit enters the Record mode and recordings on the tape are erased.
- When the tape reaches its end during playback, it is automatically unloaded from the tape transport mechanism, enters the Rewind mode and stops at the beginning of the tape.

RECORDING

❶ Load a cassette.
- Make sure that the cassette safety tab is in place.

❷ Set the INPUT select switch as required.

Set the AUDIO LIMITER to ON, if necessary.



Set the AUDIO NR switch to ON if you want to make hiss-less recordings.

LINE: Set to this position when recording video signals from the VIDEO IN connector and audio signals from the AUDIO IN connectors and/or MIC jacks.

TV: Set to this position when recording signals from the 8-pin TV connector. The audio signal is recorded onto the channel-1 audio track.

❸ Set the VIDEO MODE switch as required.

❹ Set the VIDEO SYSTEM switch as required.

❺ Press the PLAY and REC buttons simultaneously to enter the Record mode.
- When the tape reaches its end during recording, the tape is automatically rewound to the beginning and stops. During rewinding, the REW indicator lights, and when the tape reaches the beginning, the STOP indicator lights.

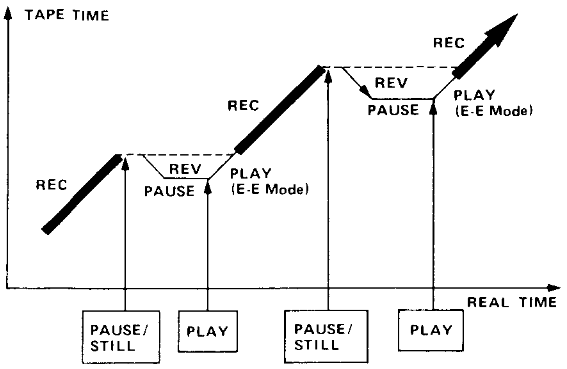
Note:

Normal recording is impossible unless the VIDEO SYSTEM switch is set correctly.

Pause control and assemble-recording

If you wish to stop recording temporarily and re-start recording immediately following the end of the previous recording, employ the PAUSE/STILL button in the following manner. This will produce well-assembled recordings with negligible distortion between recorded segments.

1. Press the PAUSE/STILL button during recording. The Record mode is released (with the REC indicator remaining lit) and the tape stops in the Pause mode after being automatically rewound by about 2 seconds of program time.
2. To re-start recording, press the PLAY button. First the Play mode is entered (however, the output signal is not the tape playback signal, but the input signal to be actually recorded). When playback proceeds to the point where the previously recorded segment was stopped with the PAUSE/STILL button (it takes about 2 seconds), the playback mode is automatically switched into the Record mode.



Note:
If you continue the Pause mode for longer than 2 to 3 minutes, the tape tension is automatically reduced to protect the tape. If you start recording from this condition, normal picture cannot be recorded for a few frames. Therefore, it is recommended that you re-start recording within this 2- to 3-minute interval.

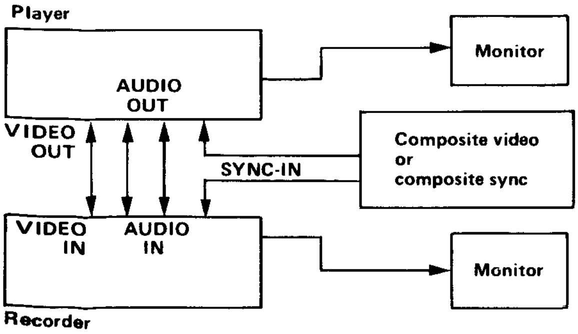
Starting recording from the Still mode
If you wish to record a new program accurately (assemble-wise) at a particular point on a previously recorded program, proceed as follows:

1. Play back the tape and locate the point from where you wish to introduce the new recording. Press the PAUSE/STILL button at that point. A still picture will appear on the monitor screen.
2. First press the REC button. Then press the PLAY button while holding the REC button pressed. The tape is first rewound by about 2 seconds of program time and then enters the Play mode.
3. When playback proceeds to the point where the Still mode was entered, recording starts automatically.

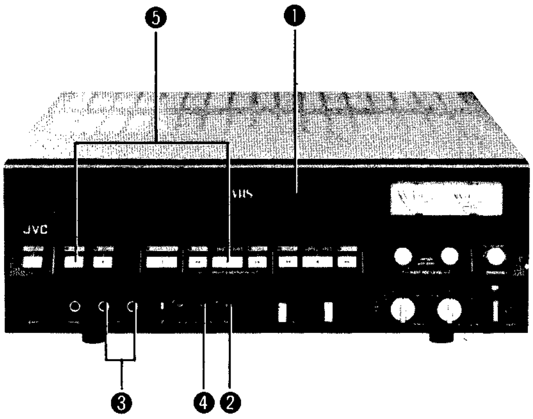
Note:
This method of editing is not "insert edit". Therefore, if the tape contains previous recordings that follow the new recording, the transition between the end of the new recording and the one made previously shows some noise.

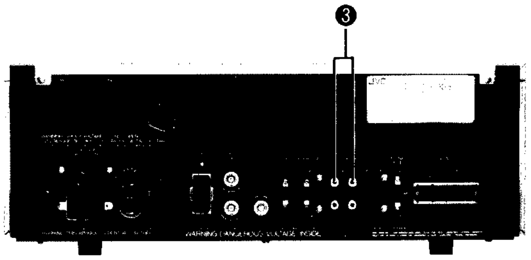
Recording the tape playback signal (tape copying)

1. Connect the player and the recorder as illustrated.
2. If you wish to drive the player locked to an external sync signal, set the PB SYNC select switch of the player to EXT.
3. Set the INPUT SELECT switch of the recorder to the LINE position.
4. Put the player in the Play mode and the recorder in the Record.



AUDIO DUBBING



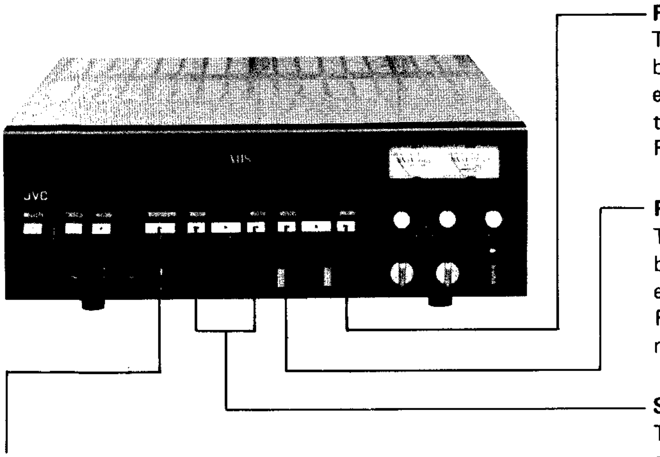


If you wish to record only audio while playing back the pre-recorded tape, proceed as follows:

❶ Load a recorded cassette.
❷ Set the INPUT SELECT switch to LINE.
❸ Connect a sound source as required.
❹ Set the AUDIO DUB select switch to CH-1 or CH-2 depending on the channel you wish to record on.
❺ Press the A. DUB and PLAY buttons simultaneously.

- When the microphone is connected, the sources from the AUDIO IN connector and the MIC jack will be mixed and recorded.

CONVENIENT FACILITIES



FAST FORWARD

To fast forward the tape, press the FF button. When the FF button is pressed in the Play or Still mode, the tape is unloaded and the Fast Forward mode is entered. During unloading, the FF and STOP indicators flash, showing that the Fast Forward mode is held in memory.

REWIND

To rewind the tape, press the REW button. When the REW button is pressed in the Play or Still mode, the tape is unloaded and the Rewind mode is entered. During unloading, the REW and STOP indicators flash, indicating that the Rewind mode is held in memory.

SHUTTLE SEARCH

The unique shuttle search function permits you to reach quickly your desired tape section while following the playback picture on the monitor screen. The tape speed is about 10 times normal and "search for a scene" is possible in both directions, either forward or reverse.

- After engaging the Play mode, press either one of the shuttle search buttons REV or FWD depending on the direction in which you are going to search for a particular scene. When your desired scene appears, press the PLAY or PAUSE/STILL button, depending on the mode you need.

STILL-PICTURE PLAYBACK and PAUSE

After engaging the Play mode by pressing the PLAY button, press the PAUSE/STILL button. The PAUSE/STILL indicator will light and the picture will "freeze" instantly.
To release the Still mode, press the PLAY button.
Refer to "RECORDING" (page 11) for the pause facility during recording.

Note:
If you leave the PAUSE/STILL button pressed during playback, the normal still picture will be lost after 2 or 3 minutes. This is because the tape tension is automatically reduced to protect the tape, and not due to any defect of the unit.

IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Prior to consulting a JVC service dealer, make sure first . . .

Symptoms	Check points
Recording is impossible.	● Is a cassette loaded? ● Are connections correct? ● Is the INPUT SELECT switch correctly set? ● Is the safety tab of the cassette in place?
Snowy picture.	● When using a TV receiver for playback, check to see if you have set the channel selector of the TV receiver to the channel of the RF converter. ● Turn the TRACKING control slowly until the picture clears.
Tape stops unexpectedly.	● Check the setting of the MEMORY switch.
Audio dubbing is impossible.	● Is the A. DUB switch properly set? ● Is the safety tab of the cassette in place?
Acoustic feedback.	● Move microphones away from TV. ● Reduce TV sound volume.
CH-2 audio level meter does not deflect.	● Check the setting of the meter function select switch to see if it is in the position for the tracking meter.

Note: If the POWER indicator should flash, consult a JVC service dealer.

SPECIFICATIONS

GENERAL

Format : VHS 1/2" (12.65 mm)
Power requirement : 100/120/220/240 V∿, 50/60 Hz
Power consumption : 76 watts (with the Automatic Editing Control Unit, 12 V ⎓ , 0.55 A)
Dimensions : 44.0(W) x 16.4(H) x 44.8(D) mm
Weight 17.9 kg
Operating temperature : 5°C to 40°C (41°F to 104°F)
Storage : -20°C to 60°C (-4°F to 140°F)
Operating position : Horizontal only
Tape speed : 23.39 mm/sec (PAL/SECAM)
33.35 mm/sec (NTSC)
Search speed : Shuttle FWD/REV ±10X
Variable 0 ~ ±5X, ±10X

VIDEO

Recording & Playback system : Rotary two-head, helical scanning system
Luminance : FM recording
Colour signal : Phase shift, converted subcarrier direct recording
Video signal system : Rec : PAL/SECAM
Playback: PAL/SECAM/NTSC
4.43 MHZ
Input Line/TV : 0.5 to 2.0 Vp-p, 75 ohms, unbalanced
Output Line /TV : 1.0 Vp-p, 75 ohms, unbalanced
Signal-to-noise ratio : Monochrome: 43 dB (Rohde and Schwarz noise meter)
Horizontal resolution : Monochrome: 250 lines (PAL),
240 lines (SECAM),
Sync input : 0.5 to 4.0 Vp-p, 75 ohms, unbalanced
Input select : TV/LINE
Sync select : INT/EXT

AUDIO

Input Line : -6/-20 dBs (selectable), 10 k ohms, unbalanced (CH-1/CH-2)
Mic : -70 to -60dBm, 600ohms, unbalanced
TV : -20 dBs, 10 k ohms, unbalanced
Output Line : -6 dBs, into 10 k ohms, unbalanced
Monitor : 0 dBs, into 10 k ohms, unbalanced (CH-1/MIX/CH-2)
Headphone : HIGH/MED/LOW, 8 to 300 ohms, unbalanced
TV : 0 dBs, low impedance, unbalanced
Signal-to-noise ratio : More than 47 dB (NR-on), 42 dB (NR-off) (at 3 % distortion level)
Frequency response : 40 to 12,000 Hz
Input select : TV/LINE
Monitor output select : CH-1/MIX/CH-2
Audio dubbing select : CH-1/CH-2

CONNECTORS

Video input/output : BNC-type connectors
SYNC input : BNC-type connector
RF output : Aerial
TV input/output : EIAJ 8-pin TV connector
Audio
Line input/output : RCA-type pin jacks
Mic : 6-mm jacks
Monitor out : DIN 5-pin
Headphone : 6 mm jack
Remote control : 45-pin connector
AC in : 3-lead AC connector
Accessory : 1 set

Design and specifications subject to change without notice.

BR-6400TR
MAGNETOSCOPE COULEUR A CASSETTE

AVERTISSEMENT:

POUR EVITER LES RISQUES D'INCENDIE OU D'ELECTROCUTION, NE PAS EXPOSER L'APPAREIL A L'HUMIDITE OU A LA PLUIE.

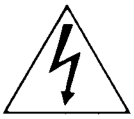
ATTENTION

RISQUE D'ELECTROCUTION
NE PAS OUVRIR

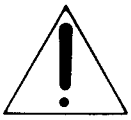
ATTENTION: POUR EVITER TOUT RISQUE D'ELECTROCUTION
NE PAS OUVRIR LE BOITIER.
AUCUNE PIECE INTERIEURE N'EST A
REGLER PAR L'UTILISATEUR.
SE REFERER A UN AGENT QUALIFIE EN CAS DE PROBLEME.

ATTENTION

Tension dangereuse à l'intérieur. Se référer à un personnel qualifié en cas de problèmes. Pour éviter tout risque d'incendie ou d'électrocution, débrancher le cordon d'alimentation de la prise secteur avant de remplacer le fusible et avant de modifier le réglage de la tension.



Le symbole de l'éclair à l'intérieur d'un triangle équilatéral est destiné à alerter l'utilisateur sur la présence d'un "voltage dangereux" non isolé dans le boîtier du produit. Ce voltage est de force suffisante pour provoquer l'électrocution de personnes.



Le point d'exclamation à l'intérieur d'un triangle équilatéral est destiné à alerter l'utilisateur sur la présence d'opérations d'entretien importantes au sujet desquelles des renseignements se trouvent dans le manuel d'instructions.

*Ces symboles ne sont utilisés qu'aux Etats-Unis.

SYSTEME D'ALIMENTATION

Branchement au réseau d'alimentation

La tension de fonctionnement de ce magnétoscope à cassette est réglée en usine sur 240 V∿.

Avant de brancher l'appareil à une prise secteur, s'assurer que le réglage du sélecteur de tension situé sur le panneau arrière corresponde bien à la tension secteur du réseau d'alimentation local.

Adaptation à la tension secteur locale

Cet appareil fonctionne aussi bien sur 100, 120 ou 220 volts que sur 240 volts, courant alternatif.

Si la tension préréglée est différente de celle de la tension secteur locale, régler le sélecteur de tension en introduisant un tournevis dans la fente du sélecteur de tension et en tournant jusqu'à ce que la tension convenable soit indiquée.

IMPORTANT: L'enregistrement d'émissions télévisées n'est permis que dans la mesure où les droits d'auteurs ou autres droits des tiers ne sont pas violés.

REMARQUE:

La plaque d'identification (numéro de série) et l'étiquette d'avertissement sont situées sur le panneau arrière de l'appareil.

SOMMAIRE

Précautions à observer 6
Caractéristiques générales 17
Commandes et connecteurs 18
Raccordements 21
Installation du convertisseur HF 24
Chargement et déchargement d'une cassette vidéo 24
Lecture 25
Enregistrement 25
Doublage son 26
Dispositifs pratiques 27
En cas de difficulté 27
Caractéristiques techniques 28

PRECAUTIONS A OBSERVER

Maniement et stockage

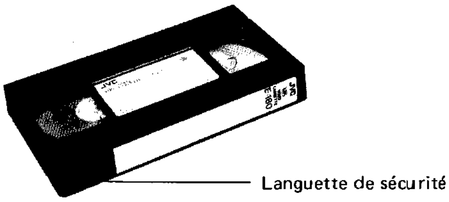
- Eviter d'utiliser le BR-6400TR dans les conditions suivantes:
  - dans les endroits soumis à des températures extrêmes de chaleur, de froid ou à l'humidité.
  - dans les endroits poussiéreux,
  - à proximité d'appareils générateurs de champs magnétiques puissants,
  - dans les endroits soumis à des vibrations et,
  - dans les endroits mal aérés.
- Faire attention à la condensation due à l'humidité.
  Eviter d'utiliser le BR-6400TR immédiatement après avoir transporté celui-ci d'un endroit froid à un endroit chaud, ou bien immédiatement après avoir réchauffé une pièce qui était auparavant froide, car la vapeur d'eau contenue dans l'air chaud se condense sur les têtes vidéo, le tambour et les guides de bande qui sont encore froids. Cette humidité risque d'endommager la bande et l'appareil.
- Prendre soin du BR-6400TR.
  - Ne pas boucher les ouïes d'aération.
  - Ne pas poser d'objets lourds sur le magnétoscope.
  - Ne pas poser d'objets risquant de se renverser et d'endommager des pièces intérieures sur le magnétoscope.
  - Utiliser l'appareil uniquement en position horizontale (à plat).
- En cas de transport,
  - Eviter d'infliger à l'appareil des chocs violents en cours de transport ou d'emballage.
  - Avant l'emballage, ne pas oublier de retirer la cassette de l'appareil.

VHS

Seules les cassettes marquées VHS peuvent être utilisées sur ce magnétoscope à cassette.

Cassettes vidéo

- Le BR-6400TR n'utilise que des cassettes de type VHS. Cassettes de type E pour l'enregistrement et la lecture PAL/SECAM. Les bandes NTSC de type T peuvent aussi être lues.
- Les cassettes vidéo sont équipées de languettes de sécurité pour éviter tout effacement accidentel. Lorsque la languette est retirée, l'enregistrement ne peut pas avoir lieu. Il est possible d'enregistrer sur une cassette dont la languette a été retirée en recouvrant l'orifice avec de l'adhésif.
- Eviter d'exposer les cassettes aux rayons directs du soleil. Toujours les garder loin des appareils de chauffage.
- Eviter les endroits extrêment humides, les vibrations violentes ou chocs, les champs magnétiques puissants (près d'un moteur, d'un transformateur ou d'un aimant) et les places poussiéreuses.
- Placer les cassettes dans leurs boîtes et les mettre toujours verticalement.



ATTENTION

Pour certaines raisons, il est nécessaire de placer l'interrupteur d'alimentation (POWER) sur ON après l'avoir placé sur OFF. Il est recommandé de ne pas le faire immédiatement et de laisser s'écouler plus de deux secondes, sinon il se peut que la cassette soit éjectée ou que l'appareil ne puisse pas être utilisé avec l'indicateur POWER clignotant. Si cela se produit, placer l'interrupteur d'alimentation sur OFF, et laisser plus de deux secondes s'écouler avant de le remettre sur ON.

ATTENTION:

Suivant l'utilisation faite, il sera peut être nécessaire de vérifier périodiquement ce magnétoscope à cassette. En cas de nécessité, consulter un agent de service JVC.

© par VICTOR COMPANY OF JAPAN, LTD.

CARACTERISTIQUES GENERALES

Enregistrement en deux systèmes/Lecture en trois systèmes
Pour plus de souplesse d'utilisation, le BR-6400TR peut enregistrer les signaux PAL et SECAM et lire les signaux PAL, SECAM et NTSC 4,43 MHz.

Entraînement direct
Le tambour des têtes est entraîné directement par un moteur CC sans balais asservi, alors que le cabestan et les bobines sont entraînés directement par des moteurs CC indépendants, assurant une instabilité réduite, des images stables et un fonctionnement plus sûr.

Chassis en aluminium moulé d'une grande robustesse
Un chassis en aluminium moulé très rigide et très résistant supporte tous les circuits du BR-6400TR.

Chargement frontal de la cassette automatique motorisé
Introduire tout simplement une cassette vidéo légèrement dans la fenêtre de la façade et le moteur de chargement placera automatiquement et silencieusement la cassette de sorte qu'elle sera correctement mise en place pour commencer la mise en route.

Système à 4 têtes
Le BR-6400TR utilise deux paires de têtes vidéo, une paire pour l'enregistrement et la lecture normale et une autre pour le ralenti, l'arrêt sur image et la recherche. Permettant non seulement de réaliser un enregistrement et une lecture de haute qualité, ceci permet aussi d'obtenir un ralenti, un arrêt sur image et une lecture accélérée très stables.

Commande entièrement logique assistée d'un microprocesseur
Tout en permettant un fonctionnement par touche à effleurement et un changement direct de mode, il permet aussi la télécommande totale de tous les modes de fonctionnement.

Recherche avant/arrière à 10 fois la vitesse normale
Ce dispositif permet de faire défiler la bande à 10 fois la vitesse normale en avant comme en arrière pour situer rapidement et avec précision une portion désirée d'un enregistrement.

Lecture à vitesse variable de l'arrêt sur image à 5 fois la vitesse normale
Lorsque le BR-6400TR est commandé par un boîtier de télécommande approprié, la vitesse de lecture peut être modifiée continuellement de l'arrêt sur image à 5 fois la vitesse normale aussi bien en avant qu'en arrière.

Cabestan asservi et possibilité de synchronisation externe
Du fait qu'il comprend un cabestan asservi et qu'il permet d'utiliser des signaux externes de référence sur lesquels sa lecture peut être verrouillée, le BR-6400TR peut s'adapter très bien à n'importe quel système vidéo existant.

Système audio à deux canaux
Deux pistes audio permettent d'effectuer des présentations bilingues.

Commandes de niveau audio avec modulomètres
Pour éviter d'effectuer des enregistrements dépassant le niveau, un circuit de limiteur audio est incorporé pour chacun des deux canaux audio. Suivant le cas, ces circuits de limiteur audio peuvent être mis en circuit ou non. Dans n'importe quel cas, il est possible d'effectuer la commande manuelle du niveau en se référant aux modulomètres.

Indicateur d'alignement
L'indicateur de niveau audio du canal 2 peut être commuté en un indicateur d'alignement de sorte qu'il est possible d'effectuer des alignements d'une grande précision pour une lecture critique.

Doublage son commutable
Le doublage son peut être effectué sur n'importe lequel des deux canaux audio.

Reproduction sonore haute fidélité
Le circuit audio assure une excellente reproduction sonore. Il est aussi assisté d'un système de réduction du bruit Dolby* incorporé, pour vous permettre d'écouter une reproduction sonore haute fidélité agréable.

Fonctions de recherche et de répétition d'une grande efficacité
Ce magnétoscope comprend la recherche par compteur, la répétition totale, la répétition par compteur et le réembobinage automatique en fin de bande.

Dispositif d'assemblage automatique à rebobinage
Ce système permet de rendre les montages presque indétectables.

Compteur de bande électronique/indicateur de temps réel
Le compteur de bande à 4 chiffres incorporé peut être commuté en un compteur de temps réel à 5 chiffres.

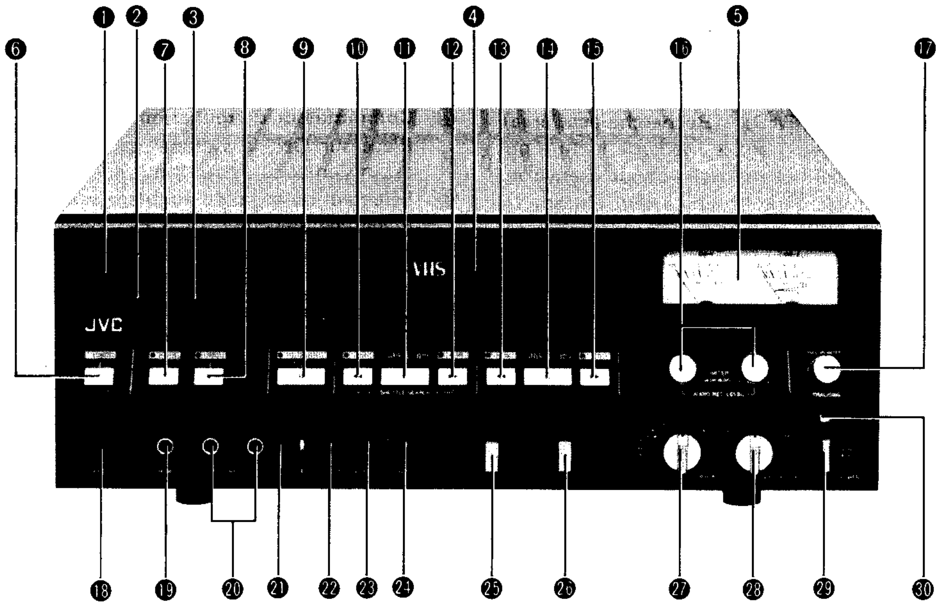
Avertissement en fin de bande
L'affichage fluorescent fonctionne comme indicateur d'avertissement de fin de bande dans le mode d'enregistrement en clignotant durant les 5 à 10 dernières minutes de la bande. (Cette durée est légèrement différente suivant les bandes.)

Boîtiers de télécommande disponibles en option
Un choix de boîtiers de télécommande compacts sont disponibles en option: un boîtier de télécommande sans fil et un boîtier de télécommande raccordable.

Liaison de commande de montage
Pour effectuer des montages plus élaborés, une liaison directe avec des unités de commande de montage automatique JVC est possible, ce qui permet d'effectuer avec précision et rapidité les montages de bandes de 1/2 pouce à 3/4 pouce.

COMMANDES ET CONNECTEURS

Façade



❶ **Compteur de bande électronique/compteur de temps réel/ indicateur d'avertissement de fin de bande**
Cet affichage fluorescent fonctionne comme compteur de bande à 4 chiffres ou comme indicateur de temps réel suivant le réglage du sélecteur de mode d'affichage ❷. Dans n'importe quel mode, l'affichage commence à clignoter 5 à 10 minutes avant la fin de la bande durant l'enregistrement. Lorsque la bande est bobiné en avant, l'affichage du compteur va dans le sens des chiffres croissants. Lorsque la bande est bobinée en arrière, l'affichage du compteur va dans le sens des chiffres décroissants et après zéro, le symbole "moins" apparaît.

❷ **Sélecteur de mode d'affichage (TAPE/LAP)**
L'affichage fluorescent fonctionne comme compteur de bande lorsque cette touche est sortie. Lorsque cette touche est enfoncée, l'affichage devient un compteur de temps réel. Pour revenir au compteur de bande, enfoncer une nouvelle fois la touche.
TAPE: Compte jusqu'à ±9999.
LAP: Compte jusqu'à ±9 heures, 59 minutes, 59 secondes.

❸ **Touche de remise à zéro (RESET)**
Enfoncer cette touche pour remettre le compteur de bande ou de temps réel à zéro.

❹ **Fenêtre de chargement de cassette**
Une fois que l'interrupteur d'alimentation est placé sur ON, introduire une cassette vidéo en plaçant le côté avec l'étiquette vers soi. Le porte-cassette se chargera du reste automatiquement et la cassette sera correctement chargée en place.

❺ **Indicateurs de niveau audio/Indicateur d'alignement**
Ces indicateurs indiquent le niveau audio durant l'enregistrement et la lecture. L'indicateur du canal 2 est commuté en indicateur d'alignement lorsque le sélecteur de fonction indicateur/commande d'alignement (TRACKING) ⓱ est sorti.

❻ **Touche d'éjection (EJECT)**
Enfoncer cette touche pour éjecter la cassette. Cette touche peut être enfoncée dans le mode d'arrêt ou immédiatement après que la touche STOP ait été enfoncée. L'indicateur EJECT clignotera durant le déchargement automatique de la cassette et il restera allumé une fois que l'éjection sera terminée.

❼ **Touche de doublage son (A. DUB)**
Enfoncer cette touche avec la touche PLAY ⓫ pour enregistrer le son sur une bande préenregistrée. Le canal sur lequel la nouvelle bande sonore devra être enregistrée peut être sélectionné par le commutateur AUDIO DUB ㉓. Durant le doublage son, les indicateurs A. DUB et PLAY s'allumeront. (L'indicateur PLAY clignote tout d'abord jusqu'à ce que le chargement de la bande soit terminé.)
- Avant de commencer le doublage son, prendre soin à ce que le commutateur AUDIO DUB ㉓ soit correctement réglé.

❽ **Touche d'enregistrement (REC)**
Enfoncer cette touche avec la touche PLAY ⓫ pour effecteur un enregistrement audio et vidéo. Le son est enregistré sur les deux canaux, s'il existe des signaux d'entrée pour eux. Les indicateurs REC et PLAY s'allument durant l'enregistrement. (L'indicateur PLAY clignote tout d'abord jusqu'à ce que le chargement de la bande soit terminé.)

❾ **Touche de pause/arrêt sur image (PAUSE/STILL)**
Enfoncer cette touche pour arrêter temporairement la bande. Lorsque cette touche est enfoncée durant la lecture ou la recherche avant/arrière, une image fixe apparaît immédiatement avec l'indicateur PAUSE/STILL allumé. Lorsque cette touche est enfoncée durant l'enregistrement, la bande est réembobinée (préenroulement) sur 2 secondes environ de programme et s'arrête dans le mode de pause. Durant le préenroulement, l'indicateur PAUSE/STILL clignote, puis une fois le préenroulement terminé, il reste allumé. Le mode de pause ou d'arrêt sur image est annulé en enfonçant la touche PLAY ⓫.

❿ **Touche de recherche arrière (REV) – (Recherche accélérée)**
En enfonçant cette touche durant le mode de lecture ou d'arrêt sur image, cela permet de lire la bande à environ 10 fois la vitesse normale dans le sens arrière. Durant la recherche, l'indicateur REV s'allumera. Pour annuler ce mode de recherche, enfoncer la touche PLAY, FF, REW, PAUSE/STILL, STOP ou FWD suivant le mode à choisir ensuite.

⓫ **Touche de lecture (PLAY)**
Lorsque cette touche est enfoncée, la bande est chargée autour du mécanisme de transport de bande et le mode de lecture est engagé. Durant le chargement, l'indicateur PLAY clignotera et, une fois le chargement terminé, il restera continuellement allumé durant la lecture. Enfoncer cette touche avec la touche REC ❽ pour effectuer un enregistrement et avec la touche A. DUB ❼ pour effectuer un doublage son.

⓬ **Touche de recherche avant (FWD) – (Recherche accélérée)**
En enfonçant cette touche durant le mode de lecture ou d'arrêt sur image, cela permet de lire la bande à environ 10 fois la vitesse normale dans le sens avant. Durant la recherche, l'indicateur FWD s'allumera. Pour annuler ce mode de recherche, enfoncer la touche PLAY, FF, REW, PAUSE/STILL, STOP ou REV suivant le mode à choisir ensuite.

⓭ **Touche de rebobinage (REW)**
Enfoncer cette touche pour réembobiner la bande à l'intérieur de la cassette. Pendant que la bande est réembobinée, l'indicateur REW s'allumera. Cette touche peut être enfoncée durant n'importe quel mode sauf ceux d'enregistrement, de doublage son et d'éjection. Pour annuler le mode de retour arrière, enfoncer la touche PLAY, STOP ou FF suivant le mode à choisir ensuite.

⓮ **Touche d'arrêt (STOP)**
Enfoncer cette touche pour décharger et arrêter la bande. Cette touche a la priorité sur toutes les autres touches. Durant le déchargement de la bande dans la cassette, l'indicateur STOP clignotera et, une fois le déchargement terminé, il restera allumé.

⓯ **Touche d'avance rapide (FF)**
Enfoncer cette touche pour faire avancer rapidement la bande à l'intérieur de la cassette. Pendant que la bande est avancée rapidement, l'indicateur FF s'allumera. Cette touche peut être enfoncée durant n'importe quel mode sauf ceux d'enregistrement, de doublage son et d'éjection. Pour annuler le mode d'avance rapide, enfoncer la touche PLAY, STOP ou REW suivant le mode à choisir ensuite.

⓰ **Commandes de niveau d'enregistrement audio/commutateurs du limiteur (AUDIO REC LEVEL/LIMIT CH-1, CH-2)**
Lorsque ces commandes sont sorties, les circuits du limiteur audio incorporé sont coupés. Pour mettre en marche les circuits du limiteur audio pour éviter des enregistrements dépassant le niveau, laisser ces commutateurs enfoncés. Qu'elles soient enfoncées ou non, ces commandes permettent de régler le niveau d'enregistrement en les tournant.

⓱ **Commande d'alignement/sélecteur de fonction de l'indicateur (TRACKING)**
Si des barres de parasites apparaissent sur l'écran, régler l'alignement en utilisant cette commande. Tirer tout d'abord la commande pour commuter l'indicateur de niveau audio du canal 2 en un indicateur d'alignement et tourner la commande jusqu'à ce que l'aiguille dévie au maximum vers la droite.

⓲ **Borne de télécommande à 7 broches (REMOTE) (DIN à 7 broches)**
Un boîtier de télécommande exclusif JVC peut être raccordé à cette borne. Un boîtier de télécommande sans fil JVC est aussi disponible. En utilisant le boîtier de télécommande sans fil, cette borne reçoit un récepteur qui est fourni avec le boîtier de télécommande.

⓳ **Prise de casque d'écoute (PHONES) (6 mmφ)**
Raccorder un casque stéréo possédant une impédance de 8 à 300 ohms à cette prise. Le canal audio choisi à l'aide du sélecteur AUDIO MONITOR ㉕ peut être entendu. Le niveau de sortie est commutable entre bas, normal et haut en utilisant le sélecteur PHONES LEVEL ㊺ du panneau arrière.

⓴ **Prises de microphones (MIC CH-1, CH-2) (6 mmφ)**
Raccorder des microphones ayant une impédance de 600 ohms et une sensibilité de –70 à –60 dBm à ces prises. Si des signaux audio sont appliqués aussi aux bornes AUDIO IN ㊷ du panneau arrière, les deux entrées sont mélangées et enregistrées.

㉑ **Indicateur de réduction du bruit audio (NR INDICATOR)**
Cette diode s'allume lorsque le commutateur AUDIO NR ㉒ est placé sur ON.

㉒ **Commutateur de réduction du bruit audio (AUDIO NR)**
Placé sur ON, le système de réduction du bruit Dolby* est mis en circuit pour réduire le souffle de la bande.

㉓ **Sélecteur du canal de doublage son (AUDIO DUB)**
Placer ce sélecteur sur CH-1 pour effectuer l'enregistrement d'une nouvelle piste sonore sur le canal 1 et sur CH-2 pour le canal 2.

㉔ **Commutateur d'entrée (INPUT)**
TV: Le placer sur cette position pour enregistrer des signaux provenant de la borne TV à 8 broches. Le son sera enregistré sur le canal-1.
LINE: Le placer sur cette position quand vous enregistrez des signaux provenant des bornes VIDEO IN et AUDIO IN (CH-1, CH-2) ou des prises MIC (CH-1, CH-2).

㉕ **Sélecteur de sortie de contrôle sonore (AUDIO MONITOR)**
Ce sélecteur permet de choisir la sortie audio disponible à la prise TV ㊱ à 8 broches, la prise de casque d'écoute ⓳ ou à la prise AUDIO MONITOR ㊹.
CH-1: Pour écouter le son du canal 1.
CH-2: Pour écouter le son du canal 2.
MIX: Pour écouter ensemble le canal 1 et le canal 2.

㉖ **Sélecteur de mode vidéo (VIDEO MODE)**
COLOUR: Le placer sur cette position quand le signal d'entrée ou de lecture vidéo est en couleur.
AUTO: Le circuit est commuté automatiquement pour la couleur ou le noir et blanc par la détection du signal d'impulsion de couleur. Cette position suffit à la plupart des besoins.
B/W: Le placer sur cette position quand le signal d'entrée ou de lecture vidéo est monochrome. Les signaux d'entrée et de sortie vidéo sont rendus en noir et blanc.

㉗ **Commutateur de mémoire de bande (MEMORY)**
La répétition automatique de la lecture de certaines portions déterminées de la bande ou la recherche automatique par la lecture "0" du compteur, etc, est possible à effectuer.
SEARCH: La bande s'arrête lorsque le compteur atteint "0000" durant le mode d'avance rapide ou de rebobinage.
OFF : Placer sur cette position lorsque ces fonctions de mémoire ne sont pas utilisées.
↻ : La bande sera automatiquement réembobinée en arrivant au bout (normalement) et elle sera lue plusieurs fois lorsqu'elle atteindra son début. La bande entière peut être reproduite automatiquement plusieurs fois de suite.
0000 → : Sur cette position, il est possible d'effectuer une répétition de la lecture de l'indication "0000" du compteur jusqu'au bout de la bande.
→ 0000 : Sur cette position, il est possible d'effectuer une répétition de la lecture du début de la bande jusqu'à l'indication "0000" du compteur.

Remarque:
Les marques inscrites sur les positions du commutateur indiquent un nombre à quatre chiffres (0000). Cependant, l'indication réelle pour zéro est à un seul chiffre (0).

㉘ **Sélecteur de système vidéo (VIDEO SYSTEM)**
SECAM: Le placer sur cette position si vous voulez enregistrer ou lire des signaux SECAM.
PAL: Le placer sur cette position si vous voulez enregistrer ou lire des signaux PAL.
MODIFIED NTSC (PLAYBACK): Le placer sur cette position si vous voulez lire des bandes NTSC. (Un moniteur TV avec un décodeur NTSC 4,43 MHz incorporé est nécessaire).

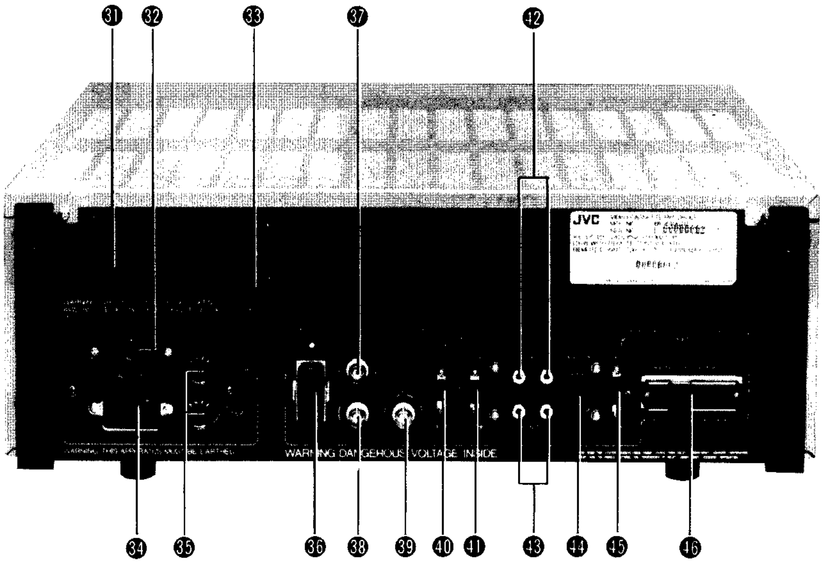
㉙ **Interrupteur d'alimentation (POWER)**

㉚ **Indicateur d'alimentation (POWER) (et d'avertissement)**
Cette diode s'allume lorsque l'alimentation est en circuit. Si le défilement de la bande est incorrect, cet indicateur se mettra à clignoter. Les causes peuvent être:

(1) Le senseur de condensation de l'humidité est en marche,
(2) La lampe du senseur de fin de bande a grillé,
(3) Le tambour des têtes ne tourne pas,
(4) Le mécanisme d'éjection ne fonctionne pas correctement,
(5) Le mécanisme de chargement et déchargement automatique ne fonctionne pas correctement, ou
(6) La bande s'arrête de défiler.

L'indicateur clignote deux fois environ par seconde dans le cas (1) et cinq fois environ dans les cinq autres cas.

Panneau arrière



㉛ **Compartiment du convertisseur HF**

㉜ **Sélecteur de tension**
Le régler sur la tension correspondant à celle de votre région. Voir page 1.

㉝ **Prise de sortie HF (RF OUT)**
Pour le raccordement d'un téléviseur via sa prise d'antenne et un sélecteur d'antenne.

㉞ **Prise d'entrée CA (AC IN)**

㉟ **Porte-fusibles**

㊱ **Prise de moniteur TV (TV) (8 broches)**
C'est une prise d'entrée/sortie à 8 broches destinée au raccordement d'un moniteur TV. Le signal audio choisi par le commutateur AUDIO MONITOR ㉕ est présent à la prise de sortie audio.

㊲ **Prise d'entrée de ligne vidéo (VIDEO IN) (Type BNC)**
C'est la prise d'entrée de ligne pour le signal vidéo.

㊳ **Prise de sortie de ligne vidéo (VIDEO OUT) (Type BNC)**
C'est la prise de sortie de ligne pour le signal vidéo.

㊴ **Prise d'entrée de signal de synchronisation externe (SYNC IN) (Type BNC)**
C'est une prise d'entrée qui accepte un signal de synchronisation externe de référence lorsque le magnétoscope doit fonctionner dans le mode de synchronisation externe. Le signal de synchronisation externe peut être un signal de synchronisation composite ou un signal vidéo composite.

㊵ **Sélecteur de synchronisation de lecture (PB SYNC)**
Placer sur EXT lorsque la lecture doit être verrouillée sur un signal de synchronisation externe.

㊶ **Sélecteur de niveau d'entrée audio(AUDIO INPUT LEVEL)**
Choisir soit -6 dB, soit -20 dB suivant le niveau du signal audio appliqué aux prises AUDIO IN. Le niveau est commuté simultanément pour les deux canaux audio.

㊷ **Prises d'entrée de ligne audio (AUDIO IN CH-1, CH-2) (Type RCA)**
Ce sont les prises d'entrée de ligne pour le signal audio du canal 1 et canal 2.

㊸ **Prises de sortie de ligne audio (AUDIO OUT CH-1, CH-2) (Type RCA)**
Ce sont les prises de sortie de ligne pour le signal audio du canal-1 et canal-2.

㊹ **Prise de sortie de contrôle audio (AUDIO MONITOR) (DIN à 5 broches)**
Le signal audio choisi par le sélecteur AUDIO MONITOR ㉕ est disponible à cette prise.

㊺ **Sélecteur de niveau de casque d'écoute (PHONES LEVEL)**
Le niveau de sortie de la prise du casque d'écoute ⑲ peut être sélectionné en trois étapes (HIGH, MED, LOW).

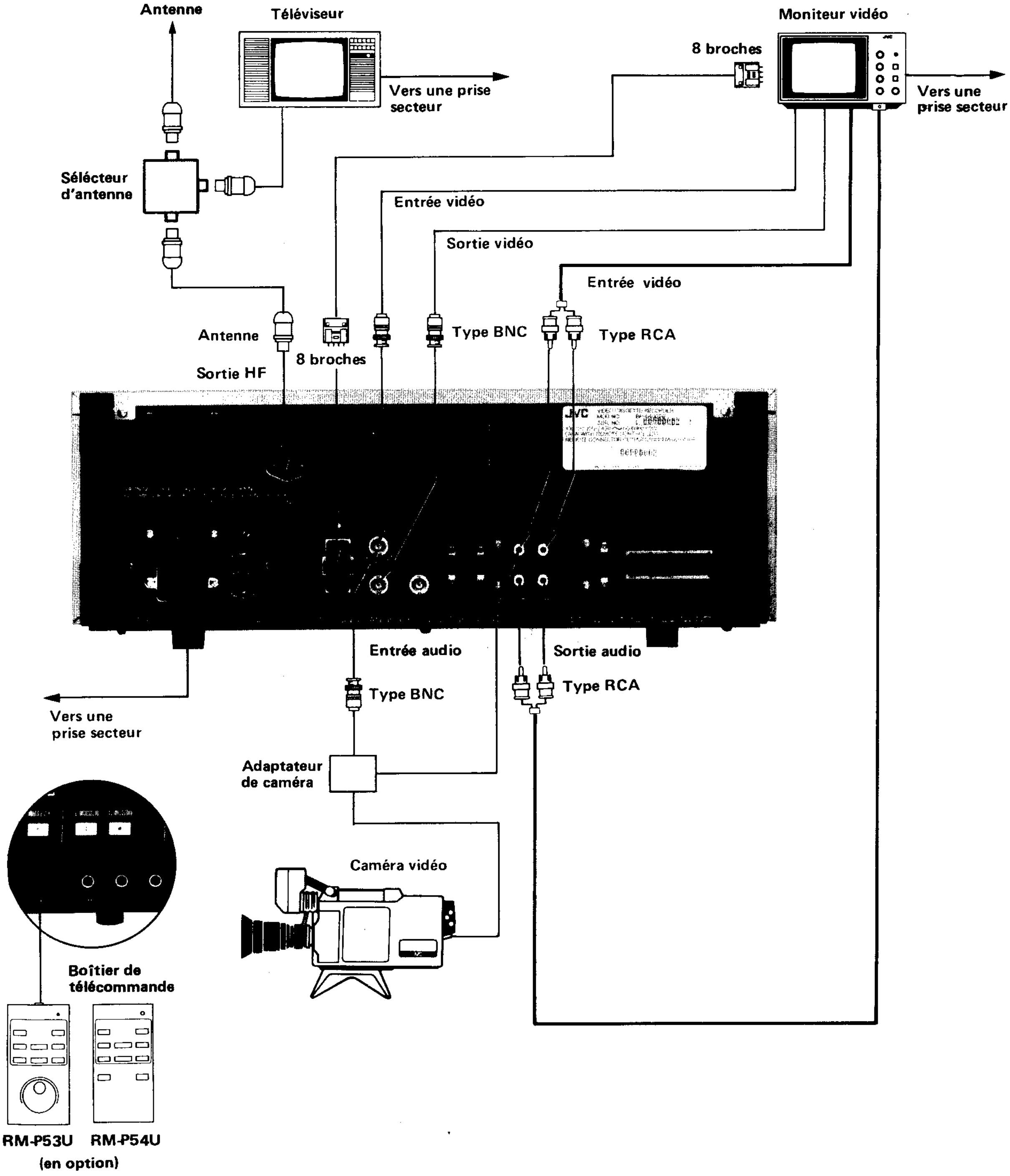
㊻ **Prise de télécommande (REMOTE) (45 broches)**
Raccorder un boîtier de télécommande à cette prise.

---

*Dolby est une marque déposée de Dolby Laboratories Licensing Corporation.

RACCORDEMENTS

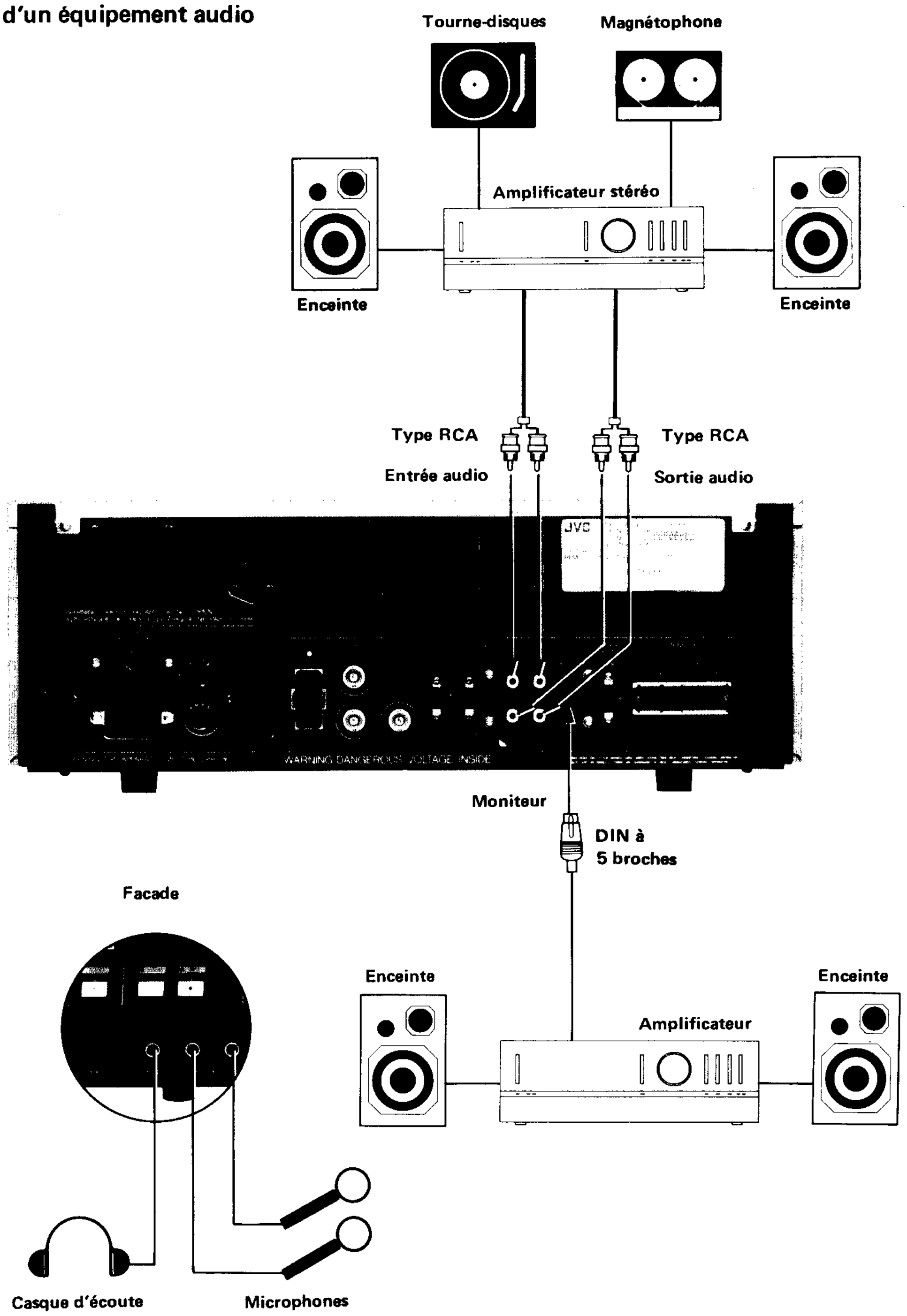
Raccordement d'un équipement vidéo


Antenne
Téléviseur
Moniteur vidéo
8 broches
Vers une prise secteur
Vers une prise secteur
Sélécteur d'antenne
Entrée vidéo
Sortie vidéo
Entrée vidéo
Antenne
Sortie HF
8 broches
Type BNC
Type RCA
JVC
Entrée audio
Sortie audio
Type BNC
Type RCA
Vers une prise secteur
Adaptateur de caméra
Caméra vidéo
Boîtier de télécommande
RM-P53U
RM-P54U
(en option)

Remarques:

- Pour enregistrer des signaux par la prise VIDEO IN, placer le sélecteur INPUT SELECT sur la position LINE.
- Pour enregistrer des signaux provenant d'un moniteur TV par la prise moniteur TV à 8 broches, placer le sélecteur INPUT SELECT sur TV. Dans ce cas, le signal audio est enregistré sur la piste du canal 1.

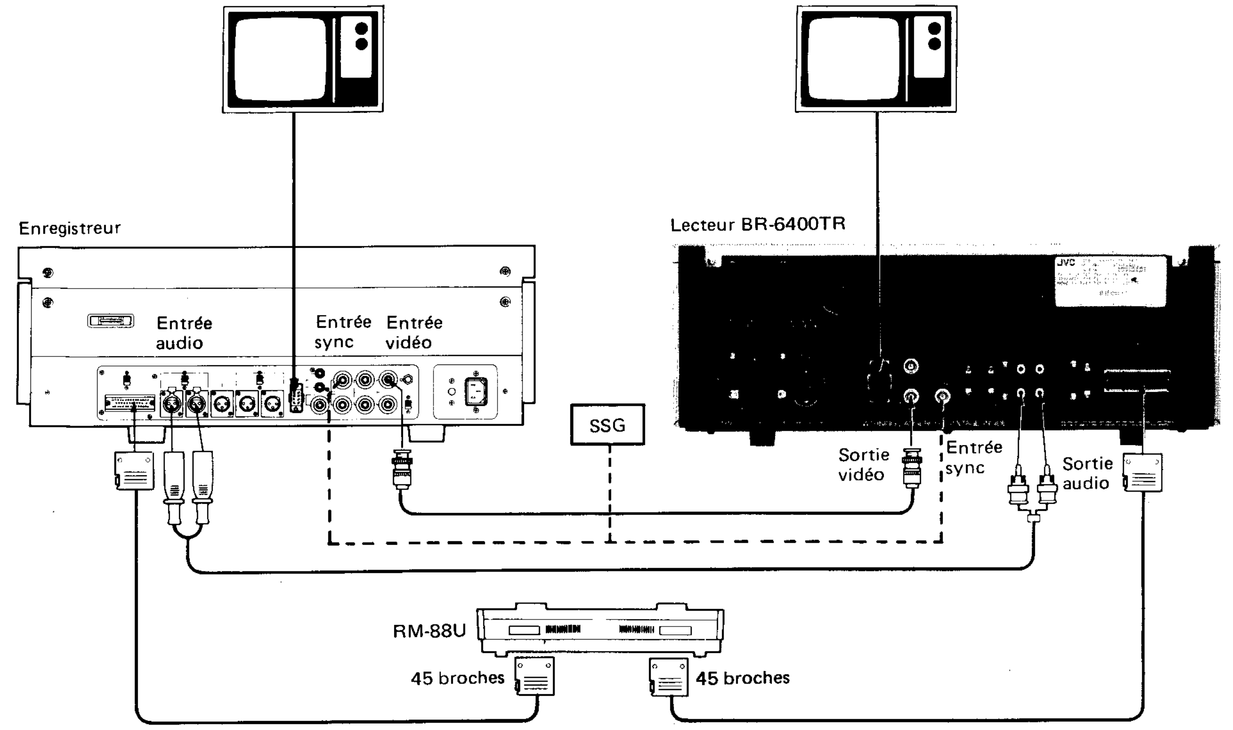
Raccordement d'un équipement audio


Tourne-disques
Magnétophone
Amplificateur stéréo
Enceinte
Enceinte
Type RCA
Entrée audio
Type RCA
Sortie audio
JVC
WARNING DANGEROUS VOLTAGE INSIDE
Moniteur
DIN à
5 broches
Facade
Enceinte
Enceinte
Amplificateur
Casque d'écoute
Microphones

Remarques:

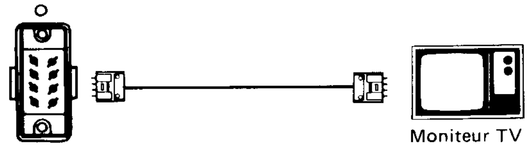
- Sélectionner soit -6 dB, soit -20 dB à l'aide du sélecteur AUDIO LEVEL suivant les appareils audio raccordés.
- Lorsque les microphones sont branchés dans les prises de la facade, le circuit de microphone est immédiatement mis en ligne et le mélange des entrées provenant des microphones et de la ligne est enregistré.

Raccordement pour montage

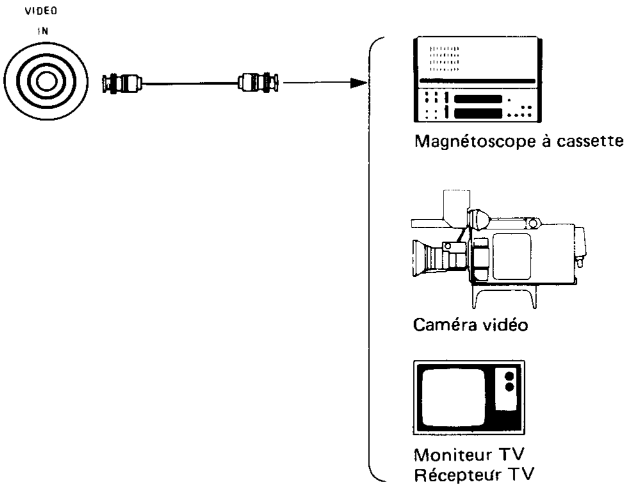

Enregistreur
Entrée audio
Entrée sync
Entrée vidéo
Lecteur BR-6400TR
SSG
Sortie vidéo
Entrée sync
Sortie audio
RM-88U
45 broches
45 broches

Remarque:
Quand vous utilisez le BR-6400TR comme lecteur dans un système de montage comprenant l'unité de commande de montage RM-88U, commencer le montage après avoir laissé défilér la bande pendant environ 10 secondes depuis le début.

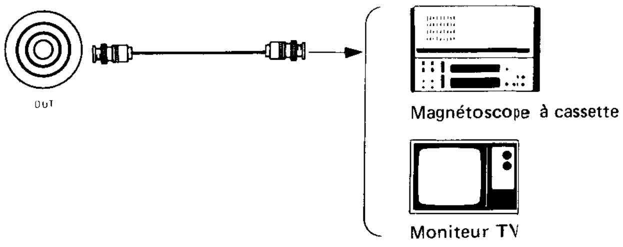
1. Borne TV (8 broches)


Moniteur TV

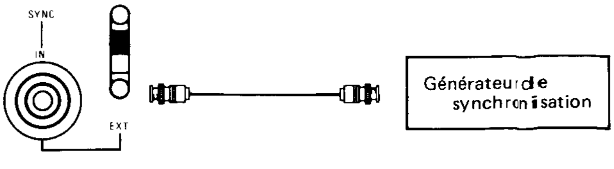
2. Borne d'entrée vidéo (BNC)


VIDEO
IN
Magnétoscope à cassette
Caméra vidéo
Moniteur TV
Récepteur TV

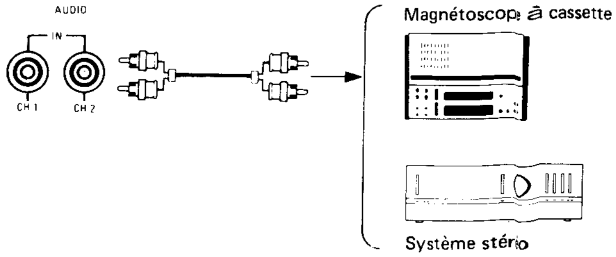
3. Borne de sortie vidéo (BNC)


OUT
Magnétoscope à cassette
Moniteur TV

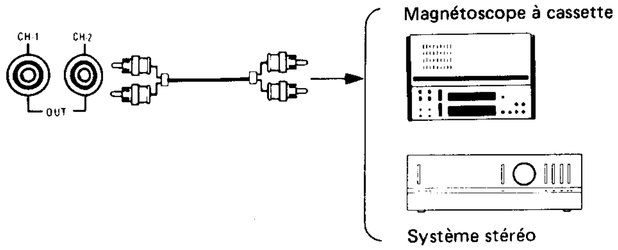
4. Borne d'entrée de synchronisation (BNC)


SYNC
IN
EXT
Générateur de synchronisation

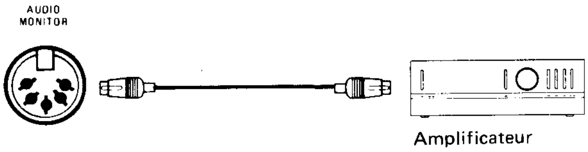
5. Borne d'entrée audio (RCA)


AUDIO
IN
CH 1
CH 2
Magnétoscope à cassette
Système stéréo

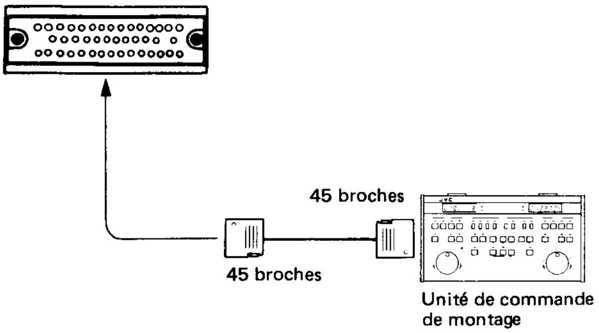
6. Borne de sortie audio (RCA)



7. Borne de contrôle audio (DIN)



8. Borne de télécommande (45 broches)



INSTALLATION DU CONVERTISSEUR HF

- S'il est nécessaire d'installer un convertisseur HF (en option), enlever le couvercle du compartiment du convertisseur HF en desserrant les deux vis. Pour connaître le modèle de convertisseur HF approprié, consulter un revendeur JVC.

Nous vous recommandons d'utiliser le convertisseur HF qui convient, c'est à dire l'un des modèles de la liste ci-dessous:

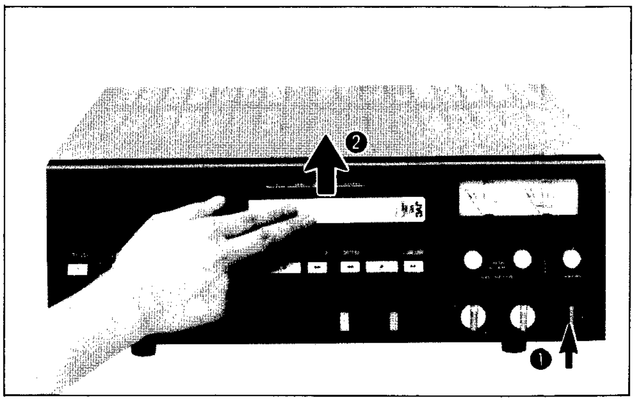
PU54120 pour le système PAL G
PU54121 pour le système PAL I
PU54122 pour le système SECAM L
PU54123 pour l'Australie

Remarque:
Lorsque vous utilisez ce magnétoscope dans des pays soumis à des lois concernant les ondes électromagnétiques, il est interdit de se servir d'un convertisseur HF qui n'appartient pas à la liste ci-dessus.

CHARGEMENT ET DECHARGEMENT D'UNE CASSETTE VIDEO

Chargement

❶ Enfoncer l'interrupteur POWER sur ON. L'indicateur EJECT clignotera.

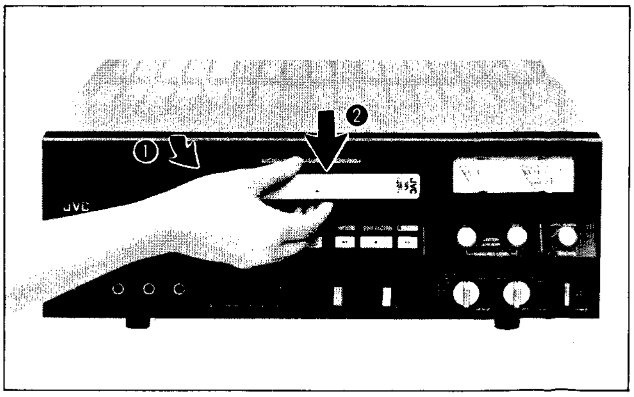


❷ Une fois que l'indicateur EJECT s'arrête de clignoter et reste allumé, introduire une cassette en plaçant le côté avec l'étiquette vers soi. La cassette sera automatiquement introduite et mise en place en position correcte.

- L'indicateur STOP clignotera durant le chargement automatique de la cassette et, lorsqu'elle sera correctement chargée, il restera allumé.
- Le mécanisme de chargement automatique fonctionnera seulement lorsque la cassette est correctement mise en place.
- Si le chargement ne s'effectue pas normalement, la cassette sera éjectée après environ 6 secondes.

Déchargement

❶ Enfoncer la touche EJECT durant le mode d'arrêt. La cassette sera éjectée automatiquement.



❷ Retirer la cassette de la fenêtre de chargement.

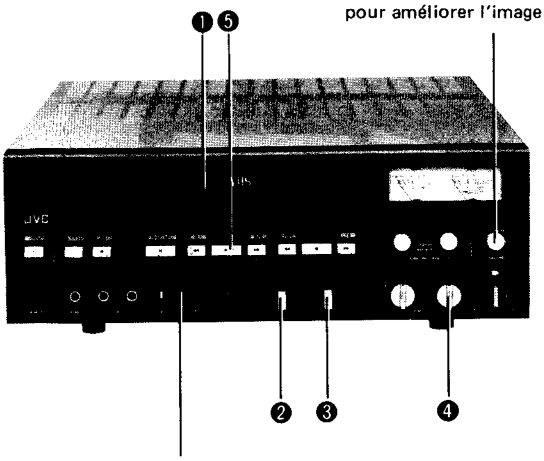
- L'indicateur EJECT clignotera durant le déchargement automatique de la cassette et il restera allumé jusqu'à la fin de l'éjection.
- La touche EJECT peut être enfoncée immédiatement après que la touche STOP ait été enfoncée. Le circuit logique mettra en mémoire la séquence; engager tout d'abord le magnétoscope dans le mode d'arrêt et il sera automatiquement changé en mode d'éjection.

LECTURE

Lecture normale

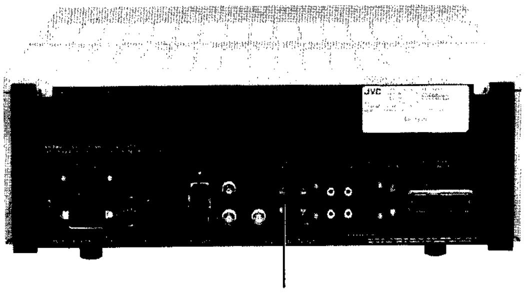
❶ Charger une cassette enregistrée.
❷ Placer le sélecteur AUDIO MONITOR comme il faut.

Si des barres parasites apparaissent sur l'écran, régler la commande TRACKING pour améliorer l'image.



Placer le commutateur AUDIO NR sur ON si la bande à lire a été enregistrée avec le commutateur AUDIO NR sur ON.

❸ Placer le sélecteur VIDEO MODE sur la position voulue.
❹ Placer le sélecteur VIDEO SYSTEM sur la position voulue.
❺ Enfoncer la touche PLAY pour mettre en route la lecture. La bande est tout d'abord chargée sur le mécanisme de transport de bande et la lecture commence ensuite. Durant le chargement de la bande, l'indicateur PLAY clignote et, une fois le chargement terminé, il reste allumé.



PB SYNC
Placer sur EXT lorsque la lecture doit être verrouillée sur un signal de synchronisation externe. (Utiliser un signal de synchronisation composite ou un signal vidéo composite comme signal de synchronisation de référence.)

Remarques:

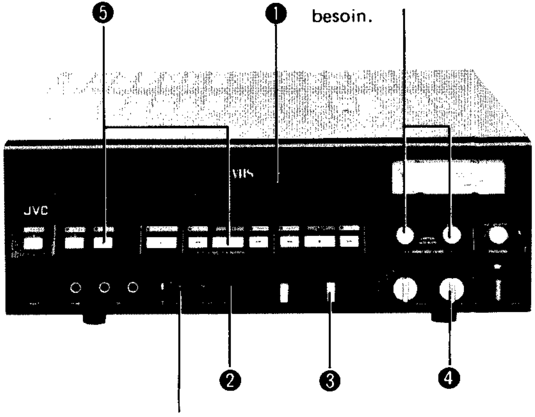
- Pour contrôler le signal appliqué à la prise d'entrée durant la lecture, enfoncer la touche REC dans le mode de lecture. Le signal d'entrée apparaîtra sur l'écran du moniteur. Ne pas enfoncer simultanément les deux touches REC et PLAY, sinon le magnétoscope se mettra dans le mode d'enregistrement et les enregistrements sur la bande seront effacés.
- Lorsque la bande arrive au bout durant la lecture, elle sera automatiquement déchargée du mécanisme de transport de bande, puis elle sera réembobinée et s'arrêtera à son début.

ENREGISTREMENT

❶ Charger une cassette.
- Prendre soin à ce que la languette de protection soit en place.

❷ Placer le sélecteur INPUT comme il faut.

Placer le commutateur AUDIO LIMITER sur ON en cas de besoin.



Placer le commutateur AUDIO NR sur ON pour effectuer des enregistrements avec moins de souffle.

LINE: Placer sur cette position pour enregistrer des signaux vidéo provenant de la prise VIDEO IN et des signaux audio provenant des prises AUDIO IN et/ou des prises MIC.
TV: Placer sur cette position pour effectuer des enregistrements de signaux provenant de la prise TV à 8 broches. Le signal audio est enregistré sur la piste audio du canal 1.

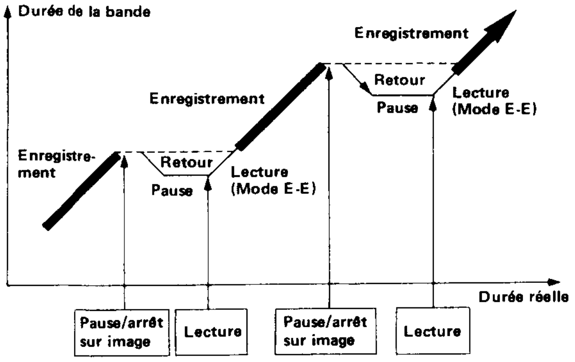
❸ Placer le sélecteur VIDEO MODE sur la position voulue.
❹ Placer le sélecteur VIDEO SYSTEM sur la position voulue.
❺ Enfoncer simultanément les touches REC et PLAY pour mettre en marche l'enregistrement.
- Lorsque la bande arrive au bout durant l'enregistrement, la bande est réembobinée automatiquement au début et s'arrête. Durant le réembobinage, l'indicateur REW s'allume et lorsque la bande atteint le début, l'indicateur STOP s'allume.

NOTE: Un enregistrement normal n'est possible que si le sélecteur VIDEO SYSTEM est placé correctement.

Commande de pause et enregistrement par assemblage

Pour arrêter temporairement l'enregistrement et le recommencer immédiatement après la fin de l'enregistrement précédent, utiliser la touche PAUSE/STILL de la manière suivante. Ceci permettra d'obtenir des enregistrements bien assemblés avec très peu de distorsion entre les portions d'enregistrement.

1. Enfoncer la touche PAUSE/STILL durant l'enregistrement. Le mode d'enregistrement sera libéré (avec l'indicateur REC restant allumé) et la bande s'arrêtera après avoir été automatiquement réembobinée sur deux secondes environ de durée de programme.
2. Remettre l'enregistrement en marche en enfonçant la touche PLAY. Tout d'abord, le mode de lecture est mis en marche (cependant, le signal de sortie n'est pas le signal de lecture de la bande, mais le signal d'entrée devant être enregistré). Lorsque la lecture arrive au point où la portion enregistrée fut arrêtée auparavant avec la touche PAUSE/STILL (il faut environ deux secondes), le mode de lecture se commute automatiquement en mode d'enregistrement.



Remarque:
Si le mode de pause se prolonge pendant plus de 2 à 3 minutes, la tension de la bande est réduite automatiquement pour protéger la bande. Pour commencer un enregistrement dans ce cas, des images normales ne pouvant pas être enregistrées pendant quelques images, il est recommandé de recommencer l'enregistrement pendant cet intervalle de 2 à 3 minutes.

Enregistrement à partir du mode d'arrêt sur image

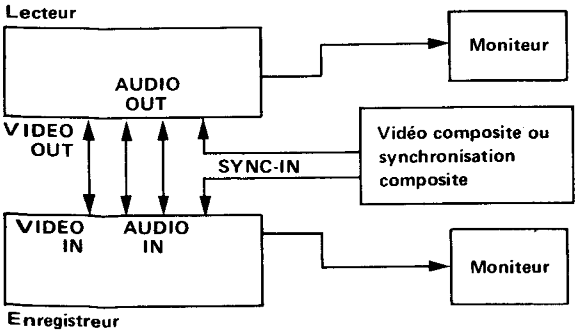
Pour enregistrer avec précision un nouveau programme (par assemblage) à un point particulier d'un programme enregistré auparavant, procéder de la manière suivante:

1. Lire la bande et situer l'endroit où le nouvel enregistrement doit commencer. Enfoncer la touche PAUSE/STILL à ce point. Une image fixe apparaîtra sur l'écran du moniteur.
2. Enfoncer tout d'abord la touche REC, puis la touche PLAY tout en maintenant la touche REC enfoncée. La bande sera réembobinée sur 2 secondes de programme et elle se mettra en mode de lecture.
3. Lorsque la lecture arrive au point où le mode d'arrêt sur image a été mis en circuit, l'enregistrement se met automatiquement en marche.

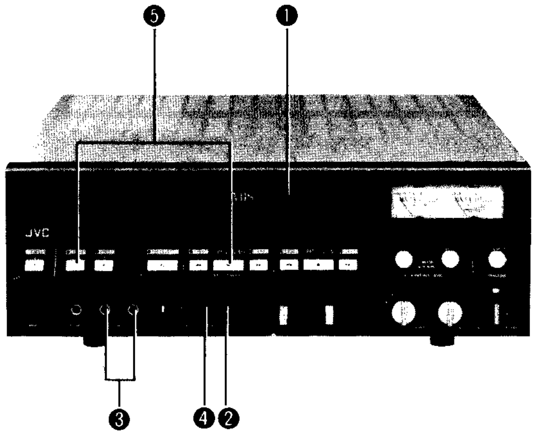
Remarque:
Cette méthode de montage n'est pas celle du montage par insertion. Par conséquent, si la bande contient des enregistrements antérieurs qui suivent le nouvel enregistrement, la transition entre la fin du nouvel enregistrement et celui fait auparavant montre un peu de parasites.

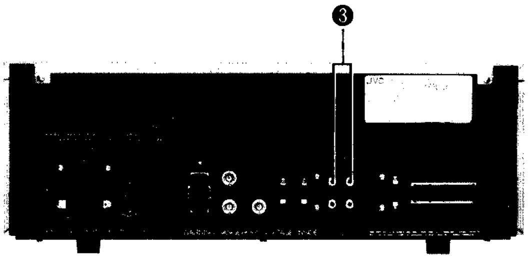
Enregistrement du signal de lecture de la bande (copie de bande)

1. Raccorder le lecteur et l'enregistreur comme il est montré.
2. Pour entraîner le lecteur en le verrouillant à un signal de synchronisation externe, placer le sélecteur PB SYNC du lecteur sur EXT.
3. Placer le sélecteur INPUT SELECT du magnétoscope sur la position LINE.
4. Placer le lecteur dans le mode de lecture et l'enregistreur en enregistrement.



DOUBLAGE SON



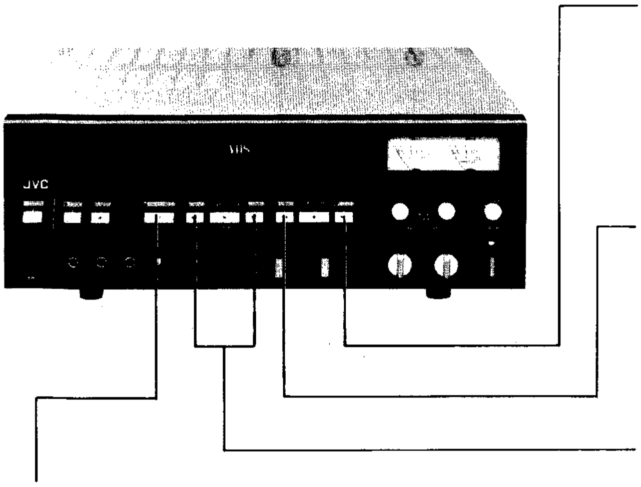


Pour enregistrer seulement le son tout en lisant une cassette préenregistrée, procéder de la manière suivante:

❶ Charger une cassette enregistré.
❷ Placer le sélecteur INPUT SELECT sur LINE.
❸ Raccorder la source sonore nécessaire.
❹ Placer le sélecteur AUDIO DUB sur CH-1 ou CH-2 suivant le canal devant être choisi.
❺ Enfoncer simultanément les touches A. DUB et PLAY.

- Lorsque le microphone est raccordé, les sources provenant de la prise AUDIO IN et de la prise MIC seront mélangées et enregistrées.

DISPOSITIFS PRATIQUES



AVANCE RAPIDE

Pour avancer rapidement la bande, enfoncer la touche FF. Lorsque la touche FF est enfoncée dans le mode de lecture ou d'arrêt sur image, la bande est déchargée et le mode d'avance rapide se met en marche. Durant le déchargement, les indicateurs FF et STOP clignoteront, indiquant que le mode d'avance rapide est maintenu en mémoire.

REBOBINAGE

Pour réembobiner la bande, enfoncer la touche REW. Lorsque la touche REW est enfoncée durant le mode de lecture ou d'arrêt sur image, la bande est déchargée et le mode de rebobinage se mettra en marche. Durant le déchargement, les indicateurs REW et STOP clignoteront, indiquant que le mode de retour arrière est maintenu en mémoire.

RECHERCHE AVANT/ARRIERE

La fonction de recherche avant/arrière permet d'atteindre rapidement une portion désirée d'un enregistrement tout en visionnant les images de lecture sur l'écran du moniteur. La vitesse de défilement de la bande est d'environ 10 fois la vitesse normale et "la recherche d'une scène" est possible en avant comme en arrière.

- Une fois le mode de lecture engagé, enfoncer soit la touche REV ou FWD suivant le sens où la recherche doit s'effectuer. Lorsque les images de la scène désirée apparaîtront, enfoncer la touche PLAY ou PAUSE/STILL, suivant le mode désiré.

ARRET SUR IMAGE et PAUSE

Une fois le mode de lecture engagé en enfonçant la touche PLAY, enfoncer la touche PAUSE/STILL. L'indicateur PAUSE/STILL s'allumera et l'image se "gélera" instantanément.
Pour libérer le mode d'arrêt sur image, enfoncer la touche PLAY.
Se reporter au chapitre "ENREGISTREMENT" (page 25) concernant le dispositif de pause durant l'enregistrement.
Remarque:
En laissant la touche PAUSE/STILL enfoncée durant la lecture, une image normale ne pourra plus être obtenue après 2 ou 3 minutes. Ceci est dû à la tension de la bande qui est automatiquement réduite pour protéger la bande, et non à un défaut de l'appareil.

EN CAS DE DIFFICULTE

Souvent, ce qui paraît être une panne n'est en réalité qu'un petit problème. Il faut s'en assurer d'abord . . .

Symptômes	Points à vérifier
L'enregistrement est impossible.	● Une cassette est-elle chargée? ● Les raccordements sont-ils corrects? ● Le sélecteur INPUT SELECT est-il correctement réglé? ● La languette de protection est-elle en place?
Image neigeuse.	● En utilisant un téléviseur pour la lecture, vérifier si le sélecteur de canaux du téléviseur est bien placé sur le canal du convertisseur HF. ● Tourner doucement la commande TRACKING jusqu'à ce que l'image devienne nette.
La bande s'arrête soudainement.	● Vérifier le réglage du commutateur MEMORY.
Le doublage son est impossible à réaliser.	● Le commutateur A. DUB est-il correctement réglé? ● La languette de protection est-elle en place?
Effet de Larsen.	● Eloigner les microphones du téléviseur. ● Réduire le volume sonore du téléviseur.
L'indicateur de niveau audio du canal 2 ne bouge pas.	● Vérifier le réglage du sélecteur de fonction de l'indicateur pour voir s'il est dans la position d'indicateur d'alignement.

Remarque: Si l'indicateur POWER clignote, consulter un revendeur JVC.

CARACTERISTIQUES TECHNIQUES

GENERAL

Format : VHS 1/2" (12,65 mm)
Alimentation : 100/120/220/240 V∿, 50/60 Hz
Consommation : 76 watts (avec l'unité de contrôle de montage automatique, 12 V ⎓, 0,55 A)
Dimensions : 44,0(L) x 16,4(H) x 44,8(P) mm
Poids : 17,9 kg
Température de fonctionnement : De 5°C à 40°C
Température de stockage : De -20°C à 60°C
Position de fonctionnement : Horizontale seulement
Vitesse de bande : 23,39 mm/sec (PAL/SECAM)
33,35 mm/sec (NTSC)
Vitesse de la recherche : Recherche avant/arrière ±10X
Variable 0 ~ ±5X, ±10X

VIDEO

Système d'enregistrement et de lecture : Système à deux têtes rotatives, balayage hélicoïdal
Luminance : Enregistrement FM
Signal de couleur : Enregistrement direct de sous-porteuse convertie et décalage de phase
Système de signal vidéo : Enr.: PAL/SECAM
Lect.: PAL/SECAM/NTSC
4,43 MHz
Entrée ligne/TV : 0,5 à 2,0 Vc-c, 75 ohms, asymétrique
Sortie ligne/TV : 1,0 Vc-c, 75 ohms, asymétrique
Rapport signal/bruit : Monochrome: 43 dB (mesureur de bruit Rohde & Schwarz)
Résolution horizontale : Monochrome: 250 lignes (PAL), 240 lignes (SECAM),
Entrées sync : 0,5 à 4,0 Vc-c, 75 ohms, asymétrique
Sélection d'entrée : TV/LINE
Sélection sync : INT/EXT

AUDIO

Entrée Ligne : -6/-20 dBs (sélectionnable), 10 kohms, asymétrique (CH-1, CH-2)
Mic : -70 à -60 dBm, 600 ohms, asymétrique
TV : -20 dBs, 10 kohms, asymétrique
Sortie Ligne : -6 dBs, à 10 kohms, asymétrique
Moniteur : 0 dBs, à 10 kohms, asymétrique (CH-1/MIX/CH-2)
Casque : HIGH/MED/LOW, 8 à 300 ohms, asymétrique
Rapport signal/bruit : Plus de 47 dB (avec le réducteur de bruit) 42 dB (sans le réducteur de bruit) (à 3 % de distorsion)
Réponse en fréquence : 40 à 12.000 Hz
Sélection d'entrée : TV/LINE
Sélection de sortie de contrôle : CH-1/MIX/CH-2
Sélection de doublage son : CH-1, CH-2

CONNECTEURS

Entrée/sortie vidéo : Bornes de type BNC
Entrée Sync : Borne de type BNC
Sortie HF : Antenne
Entrée/sortie TV : Borne TV à 8 broches EIAJ
Audio Entrée/sortie ligne : Prises de type RCA
Mic : Prises de 6 mm
Sortie de contrôle : DIN à 5 broches
Casque : Prise de 6 mm
Télécommande : Borne à 45 broches
Entrée CA : Borne CA à 3 conducteurs
Accessoire : 1 ensemble

BR-6400TR
FARB-VIDEO-CASSETTEN-RECORDER

ACHTUNG:

SCHÜTZEN SIE DIESES GERÄT VOR REGEN UND FEUCHTIGKEIT, DAMIT ES NICHT IN BRAND GERÄT ODER EIN KURZSCHLUSS ENTSTEHT.

WARNUNG
Gefährliche Spannung im Innern. Lassen Sie die Wartung der Innenteile von qualifizierten Kundendienst-Technikern durchführen. Zur Vermeidung von elektrischen Schlägen oder Feuergefahr sollten Sie das Netzkabel von der Netzsteckdose abtrennen, jeweils bevor Sie irgendeine Signalleitung oder Antenne anschließen oder abtrennen, vor Auswechslung der Sicherung und Änderung der Spannungseinstellung.

SPANNUNGSVERSORGUNG
Anschluß an das Netz

Die Betriebsspannung dieses Gerätes ist werkseitig auf 240 V∿ eingestellt.
Überprüfen Sie, ob der Spannungswähler auf der Geräterückseite auf Ihre Netzspannung eingestellt ist, bevor Sie das Gerät an das Netz anschließen.

Einstellung auf örtliche Netzspannung

Dieses Gerät kann mit 100, 120, 220 oder 240 V∿ betrieben werden. Wenn die voreingestellte Spannung nicht mit Ihrer örtlichen übereinstimmt, stellen Sie den Spannungswähler neu ein. Führen Sie einen Schraubenzieher in den Schlitz des Spannungswählers und drehen Sie ihn, bis die korrekte Spannung angezeigt ist.

HINWEIS: Das Leistungsschild (mit der Seriennummer) und die Sicherheitswarnung befinden sich an der Rückplatte des Geräts.

WICHTIG: Die Aufzeichnung von Fernsehprogrammen ist nur dann zulässig, wenn dadurch die Urheberrechte Dritter oder andere Rechte nicht verletzt werden.

INHALT

Vorsichtsmaßnahmen 30
Merkmale 31
Bedienelemente und Anschlüsse 32
Anschlüsse 35
Installation des HF-Modulators 38
Einlegen und Entnehmen einer Videocassette 38
Wiedergabe 39
Aufnahme 39
Nachvertonung 40
Weitere Funktionen 41
Störungssuche 41
Technische Daten 42

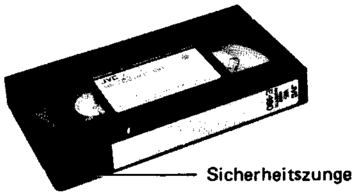
VORSICHTSMASSNAHMEN

Behandlung und Lagerung

- Vermeiden Sie eine Verwendung des BR-6400TR unter den folgenden Bedingungen:
  - an extrem heißen, kalten oder feuchten Orten,
  - an staubigen Orten,
  - in der Nähe von Geräten, die starke magnetische Felder erzeugen,
  - an Orten, die Vibrationen ausgesetzt sind und
  - an schlecht belüfteten Orten.
- Achten Sie auf Feuchtigkeits-Kondensation.
  Vermeiden Sie eine Verwendung des BR-6400TR, nachdem Sie ihn von einem kalten an einen warmen Ort gebracht haben oder nachdem Sie den kalten Raum geheizt haben. Wasserdampf in der warmen Luft schlägt sich auf der noch kalten Video-Kopftrommel und auf den Bandführungen nieder, und diese Feuchtigkeit kann zu Beschädigungen des Bandes und des Recorders führen.
- Gehen Sie sorgfältig mit dem BR-6400TR um.
  - Verschließen Sie nicht die Belüftungsöffnungen.
  - Legen Sie keine schweren Gegenstände auf den Recorder.
  - Stellen Sie keine Gefäße mit Flüssigkeit auf den Recorder, weil der Recorder beschädigt werden kann, wenn Flüssigkeit in das Innere eindringt.
  - Den Recorder nur in horizontaler (flacher) Aufstellung benutzen.
- Beim Transport:
  - Vermeiden Sie beim Verpacken und beim Transport starke Erschütterungen.
  - Entnehmen Sie die Cassette vor dem Verpacken.

Video-Cassetten

- Der BR-6400TR arbeitet nur mit Cassetten nach dem VHS-System.
  E-Typ-Cassetten für PAL/SECAM-Aufnahme und -Wiedergabe. T-Typ-NTSC-Cassetten können ebeufalls wiedergegeben werden.
- Video-Cassetten sind mit einer Sicherheitszunge zum Schutz vor versehentlichem Löschen versehen. Wenn diese Zunge entfernt wurde, ist Aufnahme nicht möglich. Wenn Sie auf einer Cassette, deren Sicherheitszunge entfernt wurde, aufnehmen wollen, überkleben Sie die Öffnung mit einem Klebeband.
- Setzen Sie die Cassetten nicht direktem Sonnenlicht aus. Halten Sie sie von Heizquellen entfernt.
- Vermeiden Sie extreme Feuchtigkeit, starke Vibrationen und Erschütterungen, starke magnetische Felder (wie in der Nähe von Motoren, Transformatoren und Magneten) und staubige Orte.
- Bewahren Sie die Cassetten in ihren Behältern auf und stellen Sie sie senkrecht auf.



ZUR BEACHTUNG
Der Netzschalter (POWER) sollte nicht sofort nach dem Ausschalten (OFF) wieder eingeschaltet (ON) werden. Warten Sie nach dem Ausschalten länger als 2 Sekunden, weil es sonst vorkommen kann, daß die Cassette ausgeworfen wird oder der Recorder sich nicht mehr bedienen läßt, wobei die Netzanzeige (POWER) blinkt. Wenn dies passiert, schalten Sie den Netzschalter wieder auf OFF und warten Sie länger als 2 Sekunden, bevor Sie den Netzschalter erneut auf ON schalten.

ZUR BEACHTUNG
Abhängig von der Benutzungshäufigkeit sollte dieser Video-Cassetten-Recorder periodisch überprüft werden. Wenden Sie sich für Wartung an Ihren JVC-Fachhändler.

VHS

Nur Cassetten mit der Kennzeichnung "VHS" können mit diesem Video-Cassetten-Recorder verwendet werden.

MERKMALE

Doppelsystem-Aufnahme/Dreifachsystem-Wiedergabe
Der BR-6400TR kann PAL- und SECAM-Signale aufnehmen und PAL-, SECAM- und 4,43 MHz NTSC-Signale wiedergeben.

Direktantrieb-System
Die Kopftrommel wird durch einen servogesteuerten bürstenlosen Gleichstrom-Motor und der Capstan und die Spulen werden durch unabhängige Gleichstrom-Motoren direkt angetrieben. Dadurch werden minimale Bildstandsschwankungen, stabile Bilder und ein zuverlässiger Betrieb gewährleistet.

Aluminium-Druckguß-Chassis für hohe Beanspruchung
Das robuste und dauerhafte Aluminium-Druckguß-Chassis ist für eine lange Benutzung des BR-6400TR unter hohen Belastungen ausgelegt.

Vollautomatischer Cassetten-Frontlademechanismus
Die Cassette wird nur leicht in die Öffnung an der Frontplatte eingeschoben, der Lademotor übernimmt sie dann und bringt sie automatisch und geräuschlos in die korrekte Betriebsposition.

4-Kopf-System
Der BR-6400TR ist mit zwei Paar Videoköpfen ausgerüstet, ein Paar für Aufnahme und normale Wiedergabe, das andere für Zeitlupe, Standbild und Suchlauf-Wiedergabe. Dieses System gewährleistet Aufnahme und Wiedergabe höchster Qualität und stabile Standbild-, Zeitupen- und Zeitraffer-Wiedergabe.

Vollogische Mikroprozessor-Steuerung
Die vollogische Mikroprozessor-Steuerung gestattet Bedienung über Leichtdrucktasten mit direktem Betriebsartenwechsel und Fernbedienung aller Bandlauf-Funktionen.

Bildsuchlauf mit zehnfacher Normalgeschwindigkeit
Mit dem Bildsuchlauf in beiden Richtungen mit dem Zehnfachen der normalen Geschwindigkeit lassen sich gesuchte Bandstellen schnell und genau finden.

Wiedergabegeschwindigkeit von Standbild bis fünffacher Normalgeschwindigkeit einstellbar
Wenn der BR-6400TR mit einer geeigneten Fernbedienung bedient wird, kann die Wiedergabegeschwindigkeit stufenlos von Standbild bis zu fünffacher Normalgeschwindigkeit in beiden Richtungen geregelt werden.

Capstan-Servo und externe Synchronisierung
Der BR-6400TR kann leicht in jedes bestehende Videosystem integriert werden, weil der Capstan servogesteuert ist und externe Sync-Signale zur Synchronisierung der Wiedergabe eingegeben werden können.

Zweikanal-Audiosystem
Die beiden Audiospuren ermöglichen Zweisprachen-Aufnahme und -Wiedergabe.

Audio-Pegelregler mit Meßinstrumenten
Zur Verhinderung von übersteuerten Aufnahmen ist jeder der beiden Audiokanäle mit einer Begrenzerschaltung ausgestattet, die je nach den Erfordernissen ein oder ausgeschaltet werden können. In jeder Schaltposition ist manuelle Aussteuerung unter Bezug auf die Meßinstrumente möglich.

Tracking-Meßinstrument
Das Meßinstrument für Kanal 2 kann auf die Funktion als Tracking-Meßinstrument umgeschaltet werden, so daß für kritische Wiedergaben genaue Spurlagenausrichtung möglich ist.

Wählbare Nachvertonung
Nachvertonung kann auf jedem der beiden Audiokanäle durchgeführt werden.

Wiedergabe in Hifi-Qualität
Die fortschrittliche Audioschaltung gewährleistet exzellente Klangreproduktion, die noch durch das eingebaute Dolby*-Rauschunterdrückungssystem verbessert wird. Dies gestattet ein Hörvergnügen mit höchster Wiedergabetreue.

Flexible Suchlauf- und Wiederholungs-Funktionen
Die Ausstattung umfaßt Zählwerk-Suchlauf, Wiederholung des gesamten Bandes, Zählwerk-Wiederholung und automatisches Rückspulen am Bandende.

Automatische Rücklauf-Schnittsteuerung
Macht Schnitte so gut wie "unsichtbar"

Elektronisches Bandzählwerk/Zeitzählwerk
Das 4-ziffrige Bandzählwerk läßt sich umschalten zu einem 5-ziffrigen Zeitzählwerk.

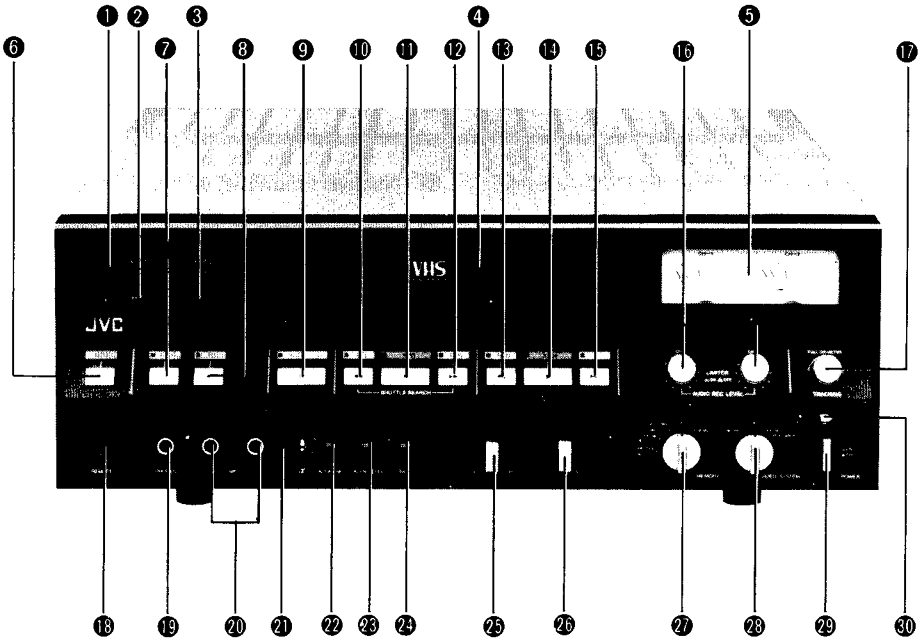
Bandende-Anzeige
Die Fluoreszenz-Anzeige arbeitet bei der Aufnahme als Bandende-Anzeige, indem sie während der letzten 5 bis 10 Minuten Bandlaufzeit blinkt. (Diese Zeit differiert geringfügig bei verschiedenen Bändern.)

Fernbedienung als Sonderzubehör
Eine Auswahl an Fernbedienungen steht zur Verfügung: eine Infrarot-Fernbedienung und eine Kabel-Fernbedienung.

Schnittsteuerung-Anschluß
Durch den direkten Anschluß von JVCs Automatischer Schnittsteuerungseinheit können Schnitte von 1/2"-Bändern auf 3/4"-Bändern schnell und genau durchgeführt werden.

BEDIENELEMENTE UND ANSCHLÜSSE

Frontplatte



❶ **Elektronisches Bandzählwerk/Zeitzählwerk/Bandende-Anzeige**
Abhängig von der Stellung des Anzeigeart-Schalters ❷ arbeitet dieses Fluoreszenz-Display als 4-ziffriges Bandzählwerk oder als 5-ziffriges Zeitzählwerk. In jeder Anzeigeart fängt das Display 5 bis 10 Minuten vor dem Bandende bei der Aufnahme an zu blinken. Wenn das Band in Vorwärtsrichtung läuft, zählt das Zählwerk aufwärts. Wenn das Band in Rückwärtsrichtung läuft, zählt das Zählwerk abwärts, nach Null wird der Anzeige ein Minuszeichen vorangestellt.

❷ **Anzeigeart-Schalter (TAPE/LAP)**
Wenn dieser Schalter nicht gedrückt ist, arbeitet das Fluoreszenz-Display als Bandzählwerk. Wenn der Schalter gedrückt wird, arbeitet es als Zeitzählwerk.
Durch nochmaliges Drücken des Schalters wird wieder auf die Funktion als Bandzählwerk zurückgeschaltet.
TAPE: Zählt bis ±9999.
LAP: Zählt bis ±9 Stunden, 59 Minuten, 59 Sekunden.

❸ **Zählwerk-Rückstelltaste (RESET)**
Durch Drücken wird das Bandzählwerk oder das Zeitzählwerk auf Null zurückgestellt.

❹ **Cassetten-Einschub**
Während der Netzschalter (POWER) auf ON steht, eine Videocassette mit der beschrifteten Seite auf Sie zeigend einschieben. Der Cassettenträger übernimmt die Cassette automatisch und bringt sie in die korrekte Position.

❺ **Audio-Aussteuerungs-Instrumente/Tracking-Meßinstrument**
Diese Meßinstrumente zeigen bei Aufnahme und Wiedergabe den Audiopegel an. Das CH-2-Meßinstrument arbeitet als Tracking-Meßinstrument, wenn der TRACKING-Regler/Meßinstrument-Wahlschalter ⓱ gezogen wird.

❻ **Auswurftaste (EJECT)**
Zum Auswerfen der Cassette drücken. Diese Taste kann bei Bandstopp oder unmittelbar nach dem Drücken der STOP-Taste gedrückt werden. Die EJECT-Anzeige blinkt beim automatischen Entladen der Cassette und leuchtet nach dem Entnehmen der Cassette.

❼ **Nachvertonungstaste (A. DUB)**
Zur Tonaufnahme auf einem bereits bespielten Band diese Taste zusammen mit der PLAY-Taste ⓫ drücken. Der Kanal, auf dem die neue Tonspur aufgenommen werden soll, wird mit dem Nachvertonungs-Kanalwahl-Schalter (AUDIO DUB) ㉓ gewählt. Während der Nachvertonung leuchten die A. DUB- und die PLAY-Anzeige. (Die PLAY-Anzeige blinkt, bis das Band geladen ist.)

- Vor der Nachvertonung überprüfen, ob der Nachvertonungs-Kanalwahl-Schalter (AUDIO DUB) ㉓ korrekt eingestellt ist.

❽ **Aufnahmetaste (REC)**
Für Video- und Audio-Aufnahme diese Taste zusammen mit der PLAY-Taste ⓫ drücken. Der Ton wird auf beide Kanäle aufgenommen, wenn für beide Kanäle Eingangssignale vorhanden sind. Während der Aufnahme leuchten die REC- und die PLAY-Anzeige. (Die PLAY-Anzeige blinkt, bis das Band geladen ist.)

❾ **Pause/Standbild-Taste (PAUSE/STILL)**
Für kurzzeitigen Bandstopp drücken. Wenn diese Taste während der Wiedergabe oder des Bildsuchlaufs gedrückt wird, erscheint sofort das Standbild, wobei die PAUSE/STILL-Anzeige leuchtet. Wenn diese Taste während der Aufnahme gedrückt wird, wird das Band um etwa 2 Sekunden Bandlaufzeit zurückgespult. Während dieses Rückspulens blinkt die PAUSE/STILL-Anzeige und leuchtet danach. Durch Drücken der PLAY-Taste ⓫ wird die Pause- oder Standbild-Betriebsart aufgehoben.

❿ **Rückwärts-Bildsuchlauf-Taste (REV)**
Durch Drücken dieser Taste während Wiedergabe oder Standbild startet die Hochgeschwindigkeits-Wiedergabe mit zehnfacher Normalgeschwindigkeit in Rückwärtsrichtung. Während des Bildsuchlaufs leuchtet die REV-Anzeige. Zum Freigeben des Bildsuchlaufs die PLAY-, FF-, REW-, PAUSE/STILL-, STOP- oder FWD-Taste drücken, je nach der gewünschten nächsten Betriebsart.

⑪ **Wiedergabetaste (PLAY)**
Wenn diese Taste gedrückt wird, wird das Band in den Bandtransportmechanismus geladen, danach startet die Wiedergabe. Während des Ladens blinkt die PLAY-Anzeige und leuchtet während der Wiedergabe. Diese Taste für Aufnahme zusammen mit der REC-Taste ⑧ und für Nachvertonung zusammen mit der A. DUB-Taste ⑦ drücken.

⑫ **Vorwärts-Bildsuchlauf-Taste (FWD)**
Durch Drücken dieser Taste während Wiedergabe oder Standbild startet die Hochgeschwindigkeits-Wiedergabe mit zehnfacher Normalgeschwindigkeit in Vorwärtsrichtung. Während des Bildsuchlaufs leuchtet die FWD-Anzeige. Zum Freigeben des Bildsuchlaufs die PLAY-, FF-, REW-, PAUSE/STILL-, STOP- oder REV-Taste drücken, je nach der gewünschten nächsten Betriebsart.

⑬ **Rückspultaste (REW)**
Zum Rückspulen des Bandes in der Cassette drücken. Beim Rückspulen leuchtet die REW-Anzeige. Diese Taste kann in jeder Betriebsart außer Aufnahme, Nachvertonung und Auswerfen der Cassette gedrückt werden. Zum Freigeben des Rückspulens die PLAY-, STOP- oder FF-Taste drücken, je nach der gewünschten nächsten Betriebsart.

⑭ **Stopptaste (STOP)**
Zum Zurückziehen in die Cassette und Stoppen des Bandes drücken. Diese Taste hat Vorrang vor allen anderen Tasten. Während des Zurückziehen des Bandes in die Cassette blinkt die STOP-Anzeige und leuchtet danach.

⑮ **Schnellvorlauftaste (FF)**
Zum Vorspulen des Bandes in der Cassette drücken. Beim Vorspulen leuchtet die FF-Anzeige. Diese Taste kann in jeder Betriebsart außer Aufnahme, Nachvertonung und Auswerfen der Cassette gedrückt werden. Zum Freigeben des Vorspulens die PLAY-, STOP- oder REW-Taste drücken, je nach der gewünschten nächsten Betriebsart.

⑯ **Audio-Aussteuerungs-Regler/Begrenzer-Schalter (AUDIO REC LEVEL/LIMIT CH-1, CH-2)**
Wenn die Regler nach außen gezogen sind, sind die eingebauten Audio-Begrenzerschaltungen ausgeschaltet. Zum Aktivieren der Audio-Begrenzerschaltungen, die übersteuerte Aufnahmen verhindern, die Regler in der gedrückten Position belassen. In jeder Position kann durch Drehen der Regler der Aufnahmepegel eingestellt werden.

⑰ **Tracking-Regler/Meßinstrument-Wahlschalter (TRACKING)**
Wenn Störzeilen auf dem Bildschirm erscheinen, das Tracking mit diesem Regler einstellen. Zuerst den Regler ziehen, um das CH-2-Aussteuerungs-Instrument auf die Funktion als Tracking-Meßinstrument umzuschalten, und dann den Regler so drehen, daß die Nadel maximal nach rechts ausschlägt.

⑱ **7 pol. DIN-Fernbedienungs-Anschluß (REMOTE)**
An diesen Anschluß kann eine JVC-Fernbedienung angeschlossen werden. Eine drahtlose Fernbedienung von JVC steht auch zur Verfügung. Wenn die drahtlose Fernbedienung benutzt wird, wird an den Anschluß ein Empfänger angeschlossen, der mit der Fernbedienung mitgeliefert wird.

⑲ **Kopfhörerbuchse (PHONES) (6 mmϕ)**
Zum Anschluß eines Stereo-Kopfhörers mit einer Impedanz von 8 – 300 Ohm. Der Kanal, der gehört werden soll, wird mit dem Audioausgang-Schalter (AUDIO MONITOR) ㉕ gewählt. Der Ausgangspegel kann mit dem Kopfhörerlautstärke-Schalter (PHONES LEVEL) ㊺ an der Rückplatte zwischen niedrig, normal und hoch geschaltet werden.

⑳ **Mikrofonbuchsen (MIC CH-1, CH-2) (6 mmϕ)**
Mikrofone mit einer Impedanz von 600 Ohm und einer Empfindlichkeit von -70 bis -60 dBm anschließen. Wenn auch an den Audio-Eingängen (AUDIO IN) ㊷ an der Rückplatte Audiosignale eingegeben werden, werden beide Eingänge gemischt aufgenommen.

㉑ **Rauschunterdrückungs-Anzeige (NR INDICATOR)**
Diese LED leuchtet, wenn der Rauschunterdrückungs-Schalter (AUDIO NR) ㉒ auf ON steht.

㉒ **Rauschunterdrückungs-Schalter (AUDIO NR)**
Zum Aktivieren der eingebauten Dolby*-Rauschunterdrückung, die das Bandrauschen reduziert, auf ON stellen.

㉓ **Nachvertonungs-Kanalwahl-Schalter (AUDIO DUB)**
Zur Nachvertonung auf Kanal 1 auf CH-1 und zur Nachvertonung auf Kanal 2 auf CH-2 stellen.

㉔ **Eingangswahl-Schalter (INPUT)**
TV: Zum Aufnehmen über den 8 pol. TV-Anschluß auf diese Position stellen. Der Ton wird auf Kanal 1 aufgenommen.
LINE: Zum Aufnehmen über die VIDEO IN-Anschlüsse und die AUDIO IN- (CH-1, CH-2) oder die MIC-Anschlüsse (CH-1, CH-2) auf diese Position stellen.

㉕ **Audioausgang-Schalter (AUDIO MONITOR)**
Dieser Schalter wählt den Audioausgang für den 8 pol. TV-Anschluß ㊱ , die Kopfhörerbuchse ⑲ und den Audioausgang (AUDIO MONITOR) ㊹ .
CH-1: Zum Hören von Kanal 1.
CH-2: Zum Hören von Kanal 2.
MIX: Zum Hören von Kanal 1 und Kanal 2 zusammen.

㉖ **Videobetriebsart-Schalter (VIDEO MODE)**
COLOUR: Auf diese Position stellen, wenn das Eingangs- oder Wiedergabe-Videosignal in Farbe ist.
AUTO: Die Schaltung für Farbe und Schwarz/Weiß wird durch Erfassen des Farb-Synchronsignals automatisch gewählt. Diese Position ist für die meisten Zwecke ausreichend.
B/W: Auf diese Position stellen, wenn das Eingangs- oder Wiedergabe-Videosignal ein Monochrom-Signal ist. Farb-Eingangs- und -Ausgangs-Signale werden in Schwarz/Weiß umgewandelt.

㉗ **Speicher-Schalter (MEMORY)**
Automatische Wiedergabe-Wiederholung von bestimmten Bandabschnitten, automatisches Suchen der Zählwerkanzeige "0" usw. ist möglich.
SEARCH : Beim Schnellvorlauf (FF) oder Rückspulen (REW) stoppt das Band an der Zählwerk-Position "0000".
OFF : Auf diese Position stellen, wenn keine der Speicher-Funktionen benutzt wird.
↻ : Das Band wird (wie gewöhnlich) am Bandende automatisch zurückgespult und dann wiederholt wiedergegeben, wenn es den Anfang erreicht. Das gesamte Band kann wieder und wieder automatisch wiedergegeben werden.
0000→↻ : In dieser Position ist wiederholte Wiedergabe von der Zählwerk-Position "0000" bis zum Bandende möglich.
↻→0000 : In dieser Position ist wiederholte Wiedergabe vom Bandanfang bis zur Zählwerk-Position "0000" möglich.

Hinweis:
Die Markierungen für die Schalterpositionen geben eine 4-ziffrige Zahl an (0000). Die tatsächliche Zählwerkanzeige für Null ist jedoch eine einziffrige Zahl (0).

㉘ **Videosystem-Wahlschalter (VIDEO SYSTEM)**
SECAM: Zur Aufnahme oder Wiedergabe von SECAM-Signalen auf diese Position stellen.
PAL : Zur Aufnahme oder Wiedergabe von PAL-Signalen auf diese Position stellen.
MODIFIED NTSC (PLAYBACK): Zur Wiedergabe von NTSC-Bändern auf diese Position stellen. (Ein Fernseh-Monitor mit eingebautem 4,43 MHz NTSC-Dekoder ist erforderlich.)

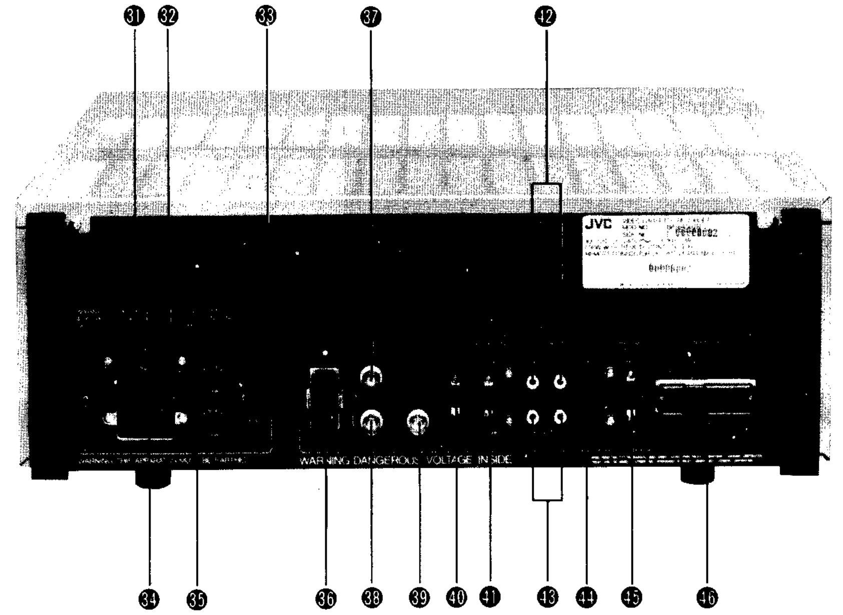
㉙ **Netzschalter (POWER)**

㉚ **Netzanzeige (POWER) (und Warnanzeige)**
Diese LED leuchtet, wenn die Spannungsversorgung eingeschaltet ist. Wenn beim Bandlauf Fehlfunktionen auftreten, blinkt die Anzeige.

Die Ursachen können sein:
(1) der Kondensations-Sensor ist in Betrieb,
(2) die Bandende-Sensorlampe ist defekt,
(3) die Kopftrommel dreht sich nicht,
(4) der Auswurf-Mechanismus arbeitet nicht richtig,
(5) der automatische Band-Lade- und -Entlade-Mechanismus arbeitet nicht richtig oder
(6) das Band läuft nicht.

Die Anzeige blinkt im Fall (1) etwa zweimal pro Sekunde und in den anderen Fällen etwa einmal pro Sekunde.

Rückplatte



㉛ **HF-Modulator-Teil**

㉜ **Spannungswähler**
Auf die Netzspannung in Ihrem Gebiet einstellen. Siehe Seite 29.

㉝ **HF-Ausgang (RF OUT)**
Zum Anschluß eines Fernsehempfängers über das Antennenkabel und einen Antennenwähler.

㉞ **Netzkabel-Anschluß (AC IN)**

㉟ **Sicherungshalter**

㊱ **Fernseh-Monitor-Anschluß (TV) (8 pol.)**
Dies ist ein 8 pol. Eingangs/Ausgangs-Anschluß zum Anschließen eines Fernseh-Monitors. Das Audiosignal, das mit dem AUDIO MONITOR-Schalter ㉕ gewählt wurde, liegt am Audio-Ausgang an.

㊲ **Video-Direkteingang (VIDEO IN) (BNC-Buchse)**
Direkteingang für das Videosignal.

㊳ **Video-Direktausgang (VIDEO OUT) (BNC-Buchse)**
Direktausgang für das Videosignal.

㊴ **Eingang für externes Sync-Signal (SYNC IN) (BNC-Buchse)**
Zur Eingabe eines externen Sync-Signals, wenn der Recorder mit einem externen Sync-Signal synchronisiert werden soll. Das externe Sync-Signal kann ein Sync-Signal oder ein BAS-Signal sein.

㊵ **Wiedergabe-Synchronisation-Wahlschalter (PB SYNC)**
Auf EXT stellen, wenn die Wiedergabe mit einem externen Sync-Signal synchronisiert werden soll.

㊶ **Audio-Eingangspegel-Wahlschalter (AUDIO INPUT LEVEL)**
Abhängig vom Audiosignal, das an den AUDIO IN-Anschlüssen eingegeben wird, auf -6 dB oder -20 dB stellen. Der Pegel wird für beide Audiokanäle gleichzeitig umgeschaltet.

㊷ **Audio-Direkteingänge (AUDIO IN CH-1, CH-2) (RCA-Buchsen)**
Direkteingänge für das Audiosignal für Kanal 1 und Kanal 2.

㊸ **Audio-Direktausgänge (AUDIO OUT CH-1, CH-2) (RCA-Buchsen)**
Direktausgänge der Audiosignale von Kanal 1 und Kanal 2.

㊹ **Audio-Überwachungs-Ausgang (AUDIO MONITOR) (DIN-Buchse, 5 pol.)**
Das mit dem AUDIO MONITOR-Schalter ㉕ gewählte Audiosignal ist erhältlich.

㊺ **Kopfhörerlautstärke-Schalter (PHONES LEVEL)**
Der Ausgangspegel der Kopfhörerbuchse ⑲ kann in drei Stufen (hoch (HIGH), mittel (MED), niedrig (LOW)) gewählt werden.

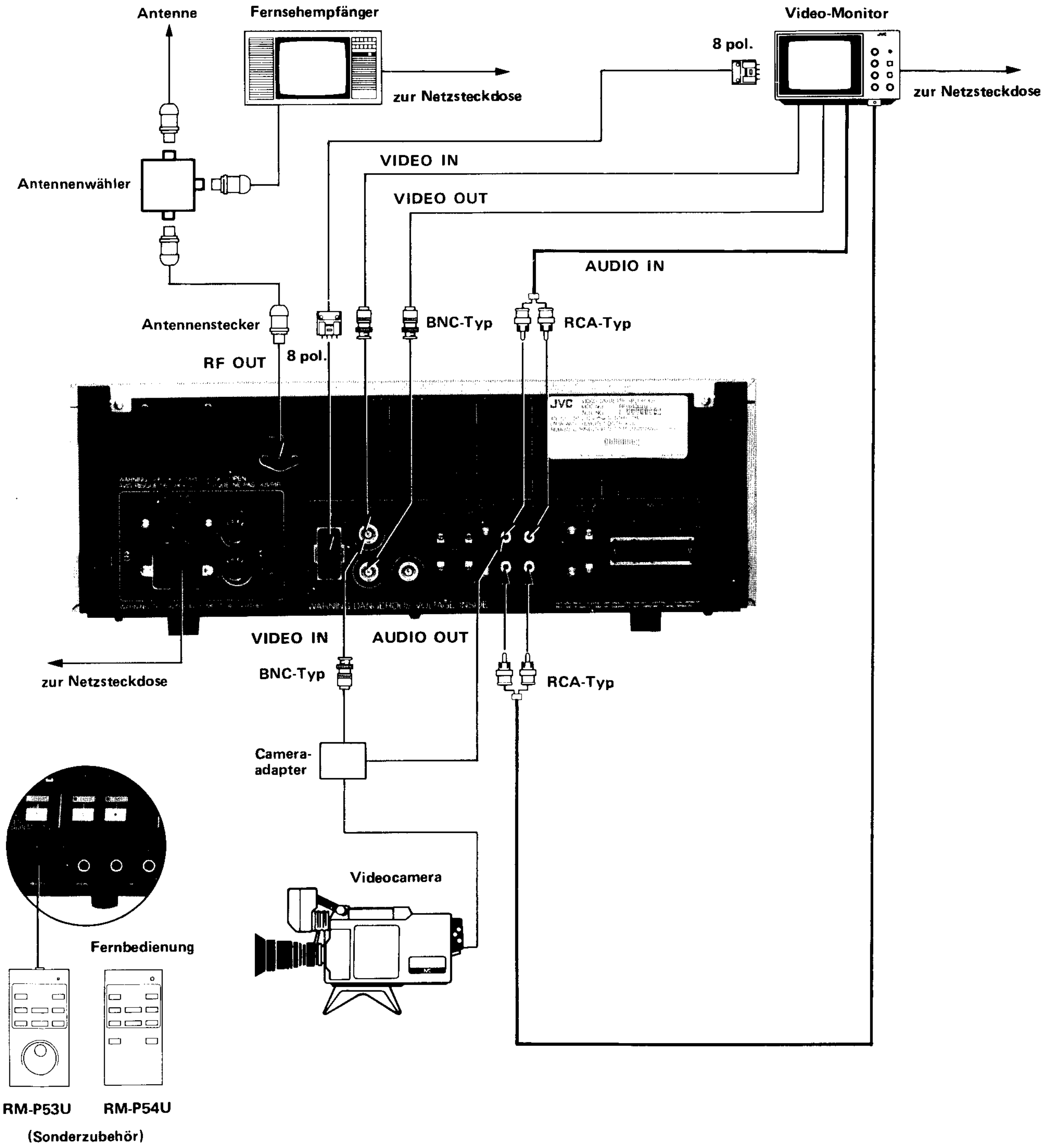
㊻ **Fernbedienungs-Anschluß (REMOTE) (45 pol.)**
Zum Anschluß einer JVC-Fernbedienung.

---

*Dolby ist ein Warenzeichen der Dolby Laboratories Licensing Corporation.

ANSCHLÜSSE

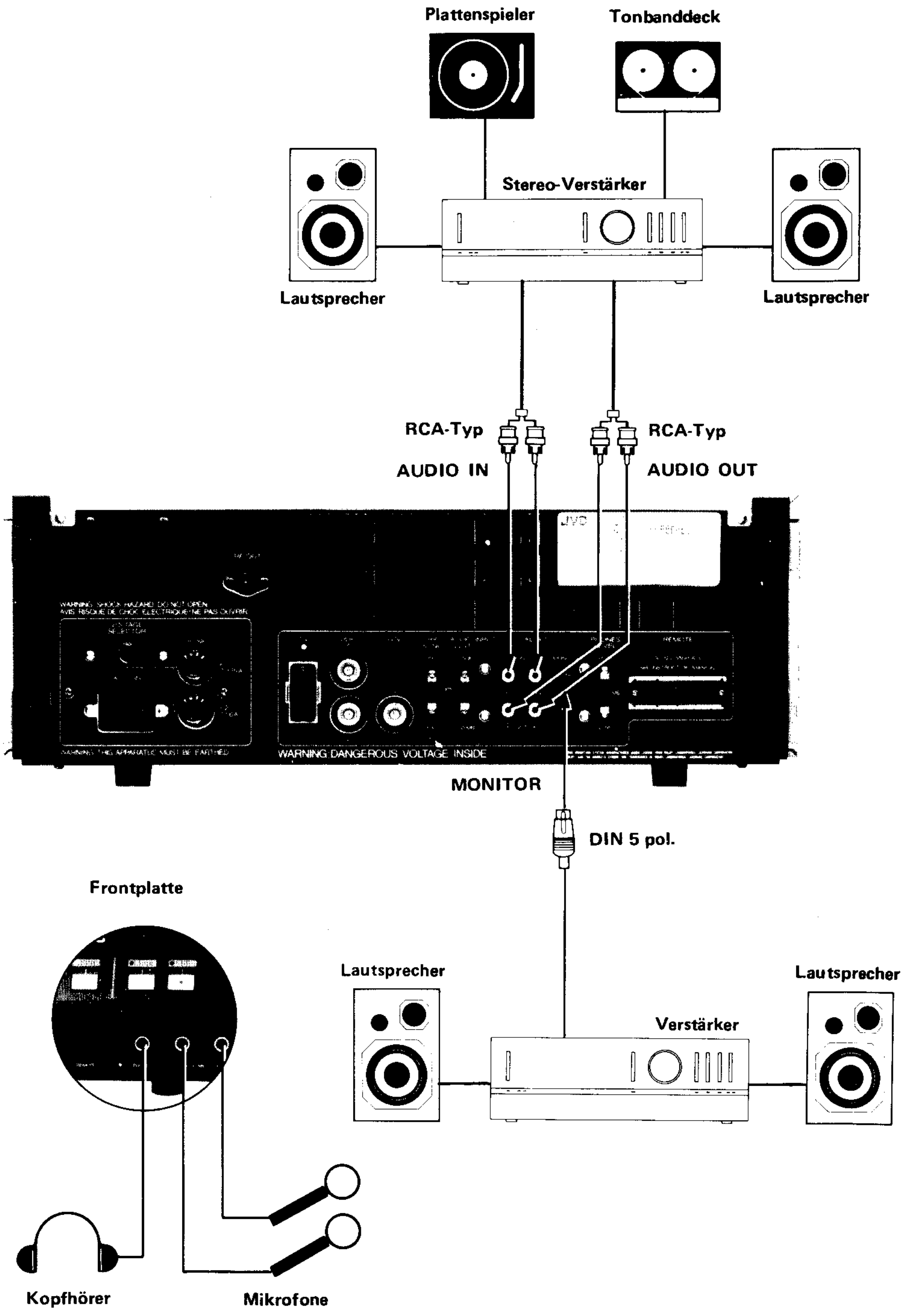
Anschluß von Video-Ausrüstung


Antenne
Fernsehempfänger
zur Netzsteckdose
Video-Monitor
8 pol.
zur Netzsteckdose
Antennenwähler
VIDEO IN
VIDEO OUT
AUDIO IN
Antennenstecker
BNC-Typ
RCA-Typ
RF OUT
8 pol.
JVC
VIDEO IN
AUDIO OUT
zur Netzsteckdose
BNC-Typ
RCA-Typ
Camera-
adapter
Videocamera
Fernbedienung
RM-P53U
RM-P54U
(Sonderzubehör)

Hinweise:

- Zur Aufnahme von Signalen über den VIDEO IN-Anschluß den INPUT-Schalter auf LINE stellen.
- Zur Aufnahme von Signalen von einem Fernseh-Monitor über den 8 pol. Fernseh-Monitor-Anschluß den INPUT-Schalter auf TV stellen. In diesem Fall wird das Audiosignal auf Kanal 1 aufgenommen.

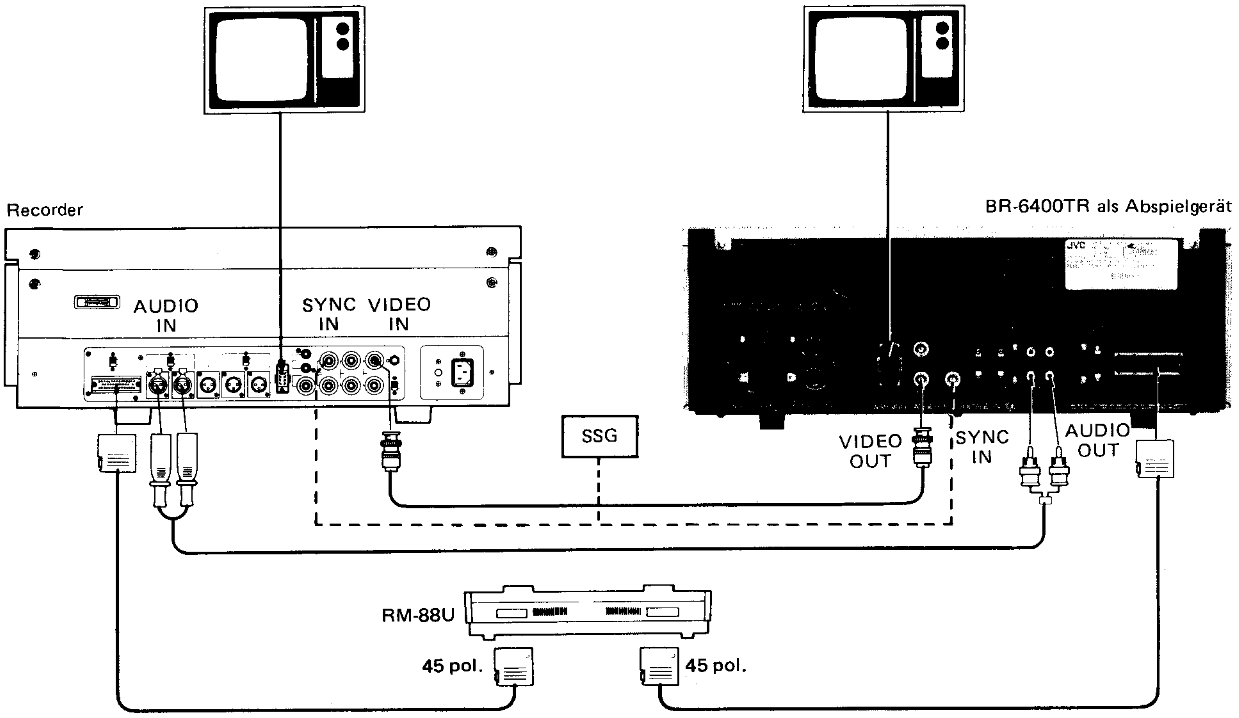
Anschluß von Audio-Ausrüstung


Plattenspieler
Tonbanddeck
Stereo-Verstärker
Lautsprecher
Lautsprecher
RCA-Typ
AUDIO IN
RCA-Typ
AUDIO OUT
WARNING DANGEROUS VOLTAGE INSIDE
MONITOR
DIN 5 pol.
Frontplatte
Lautsprecher
Verstärker
Lautsprecher
Kopfhörer
Mikrofone

Hinweise:

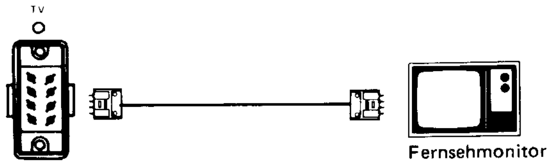
- Abhängig von den angeschlossenen Audio-Geräten entweder -6 dB oder -20 dB mit dem AUDIO LEVEL-Wahlschalter wählen.
- Wenn an den Mikrofonbuchsen an der Frontplatte Mikrofone angeschlossen sind, wird die Mikrofonschaltung automatisch der Audioschaltung zugeschaltet, so daß die Mikrofone und die Direkteingänge gemischt aufgenommen werden.

Anschluß für Schnittsteuerung

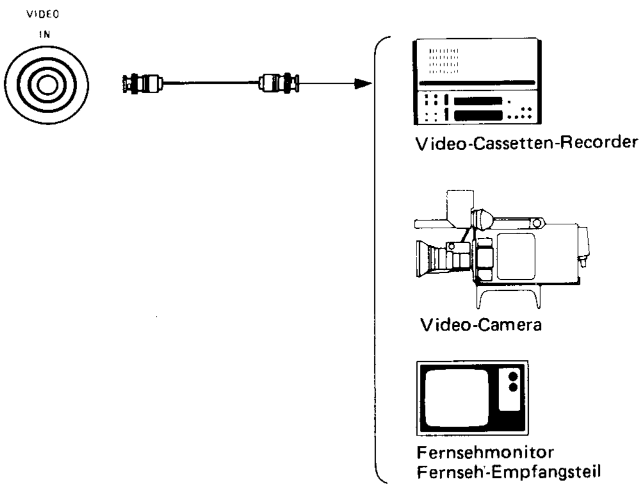

Recorder
AUDIO IN
SYNC IN
VIDEO IN
BR-6400TR als Abspielgerät
SSG
VIDEO OUT
SYNC IN
AUDIO OUT
RM-88U
45 pol.
45 pol.

Hinweis:
Wenn der BR-6400TR innerhalb eines Schnittsteuerungssystems, unter Verwendung des Schnittsteuergeräts RM-88U, als Abspielgerät benutzt wird, dann erst mit der Schnittsteuerung beginnen, nachdem etwa 10 Sekunden des Bandanfangs gespielt wurden.

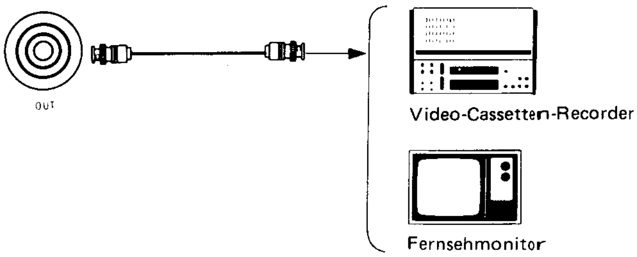
1. TV-Anschluß (8 pol.)


TV
Fernsehmonitor

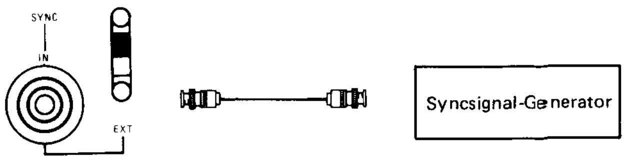
2. VIDEO IN-Anschluß (BNC)


VIDEO
IN
Video-Cassetten-Recorder
Video-Camera
Fernsehmonitor
Fernseh-Empfangsteil

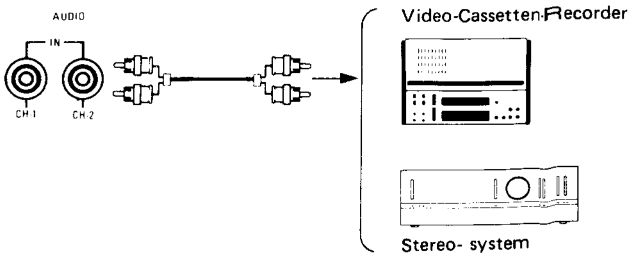
3. VIDEO OUT-Anschluß (BNC)


OUT
Video-Cassetten-Recorder
Fernsehmonitor

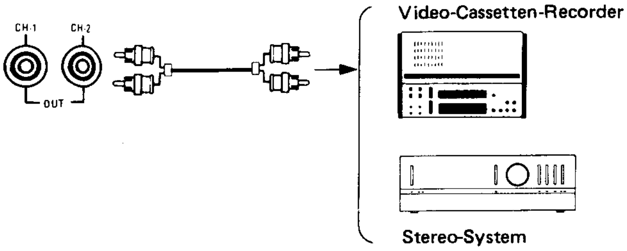
4. SYNC IN-Anschluß (BNC)


SYNC
IN
EXT
Syncsignal-Generator

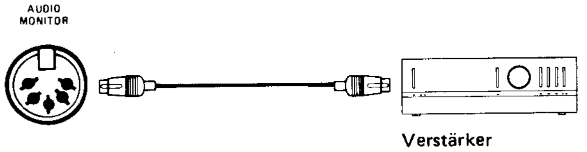
5. AUDIO IN-Anschluß (RCA)


AUDIO
IN
CH 1
CH 2
Video-Cassetten-Recorder
Stereo- system

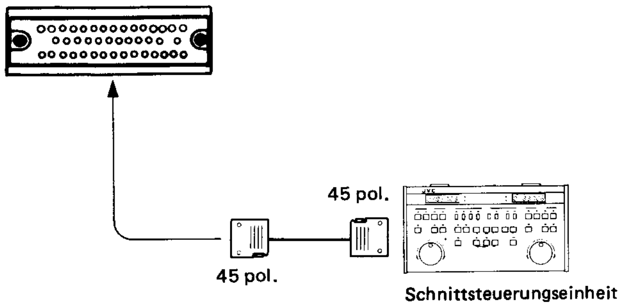
6. AUDIO OUT-Anschluß (RCA)



7. AUDIO MONITOR-Anschluß (DIN)



8. REMOTE-Anschluß (45 pol.)



INSTALLATION DES HF-MODULATORS

Zum Installieren eines HF-Modulators (als Sonderzubehör erhältlich) die Abdeckung des HF-Modulator-Teils durch Lösen der beiden Schrauben abnehmen. Wenden Sie sich für ein geeignetes HF-Modulator-Modell an Ihren JVC-Fachhändler.

Wir empfehlen den Anschluß eines HF-Modulators mit einer der folgenden Teilebezeichnungen:

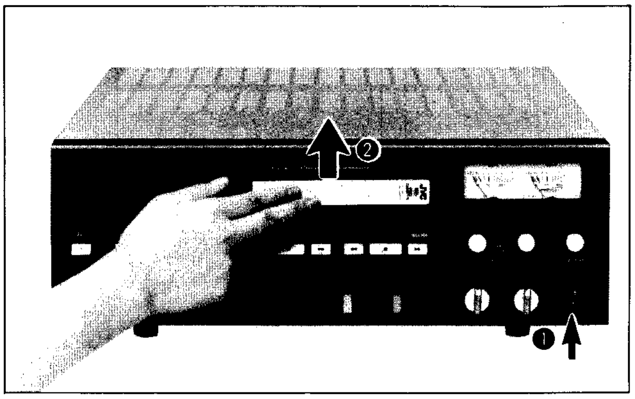
PU54120 für PAL-System G
PU54121 für PAL-System I
PU54122 für SECAM-System L
PU54123 für Australien

Hinweis:
Bei der Benutzung dieses Video-Recorders in Gebieten, in denen Bestimmungen zur Einschränkung elektromagnetischer Wellen gelten, ist der Anschluß eines anderen HF-Modulators als eines der oben aufgeführten Modelle untersagt.

EINLEGEN UND ENTNEHMEN EINER VIDEOCASSETTE

Einlegen

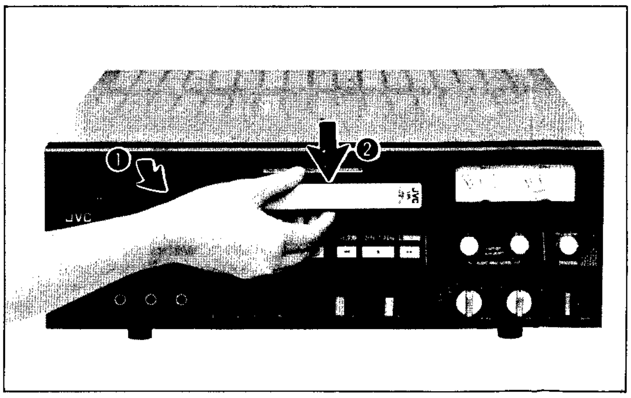
❶ Den Netzschalter (POWER) auf ON drücken. Die EJECT-Anzeige blinkt.



❷ Nachdem die EJECT-Anzeige zu blinken aufhört und konstant leuchtet, eine Cassette mit der beschrifteten Seite auf Sie zeigend einschieben. Die Cassette wird automatisch zurückgezogen und in die richtige Position geladen.
- Beim automatischen Laden der Cassette blinkt die STOP-Anzeige und leuchtet konstant, wenn die Cassette korrekt geladen wurde.
- Der automatische Lademechanismus arbeitet nur, wenn die Cassette korrekt in den Cassetten-Einschub eingeführt wird.
- Wenn die Cassette beim Laden nicht in die korrekte Position gebracht werden kann, wird sie automatisch nach etwa 6 Sekunden ausgeworfen.

Entnehmen

❶ Die EJECT-Taste drücken, während das Gerät auf Stopp steht. Die Cassette wird automatisch ausgeworfen.



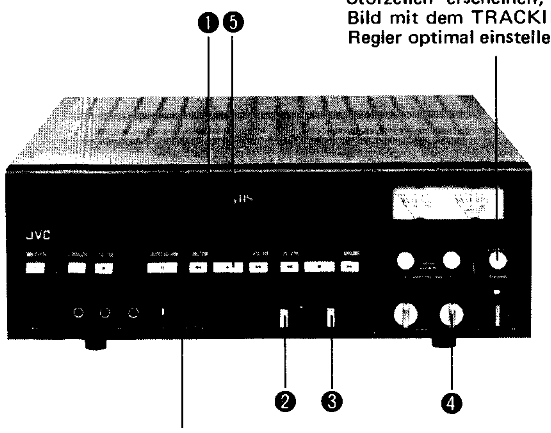
❷ Die Cassette vom Cassetten-Einschub entnehmen.
- Die EJECT-Anzeige blinkt beim automatischen Entladen der Cassette und leuchtet konstant nach dem Auswerfen.
- Die EJECT-Taste kann unmittelbar nach dem Drücken der STOP-Taste gedrückt werden. Die logische Steuerung speichert die Reihenfolge, stoppt zuerst den Recorder und wirft dann automatisch die Cassette aus.

WIEDERGABE

Normale Wiedergabe

❶ Eine bespielte Cassette einlegen.

❷ Den AUDIO MONITOR-Schalter wie erforderlich einstellen.



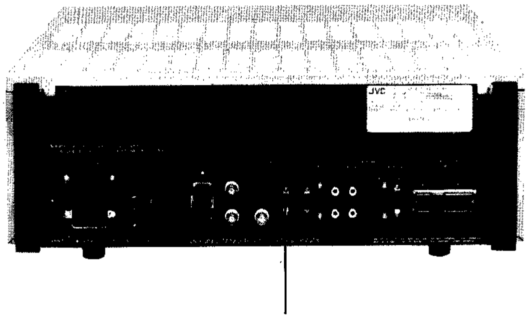
Wenn auf dem Bildschirm Störzeilen erscheinen, das Bild mit dem TRACKING-Regler optimal einstellen.

Bei der Wiedergabe von Cassetten, die mit dem AUDIO NR-Schalter auf ON gestellt aufgenommen wurden, den AUDIO NR-Schalter auf ON stellen.

❸ Den VIDEO MODE-Schalter wie erforderlich einstellen.

❹ Den VIDEO SYSTEM-Schalter wie erforderlich einstellen.

❺ Für Wiedergabestart die PLAY-Taste drücken. Das Band wird zuerst in den Bandtransportmechanismus gezogen, danach beginnt die Wiedergabe. Während des Ladens blinkt die PLAY-Anzeige und leuchtet danach konstant.



PB SYNC
Auf EXT stellen, wenn die Wiedergabe mit einem externen Sync-Signal synchronisiert werden soll. (Zum Synchronisieren ein Sync-Signal oder ein BAS-Signal verwenden.)

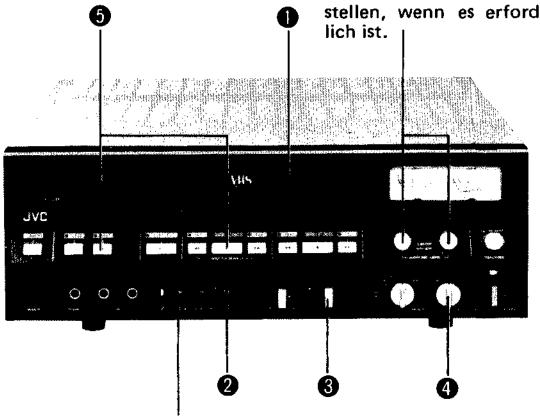
Hinweise:

- Zum Überwachen des Eingangs-Signals bei der Wiedergabe die REC-Taste in der Wiedergabe-Betriebsart drücken. Daraufhin erscheint das Eingangs-Signal auf dem Monitorschirm. Nicht die REC- und PLAY-Tasten gleichzeitig drücken, weil sonst das Gerät auf Aufnahme schaltet und die Aufnahmen auf dem Band gelöscht werden.
- Wenn bei der Wiedergabe das Bandende erreicht wird, wird das Band automatisch aus dem Bandtransportmechanismus zurückgezogen, zurückgespult und am Bandanfang gestoppt.

AUFNAHME

❶ Eine Cassette einlegen.
- Die Sicherheitszunge der Cassette darf nicht herausgebrochen sein.

❷ Den INPUT-Wahlschalter wie erforderlich einstellen.



Den Audiobegrenzer (AUDIO LIMITER) auf ON stellen, wenn es erforderlich ist.

Für rauscharme Aufnahmen den AUDIO NR-Schalter auf ON stellen.

LINE: Zur Aufnahme von Videosignalen von den VIDEO IN-Anschlüssen und Audiosignalen von den AUDIO IN-Anschlüssen und/oder den MIC-Buchsen auf diese Position stellen.

TV: Zur Aufnahme von Signalen von dem 8 pol. TV-Anschluß auf diese Position stellen. Das Audiosignal wird auf Kanal 1 aufgenommen.

❸ Den VIDEO MODE-Schalter wie erforderlich einstellen.

❹ Den VIDEO SYSTEM-Schalter wie erforderlich einstellen.

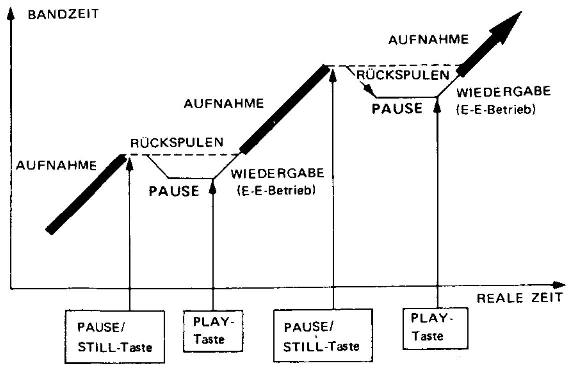
❺ Für Aufnahmestart die PLAY- und REC-Tasten gleichzeitig drücken.
- Wenn während der Aufnahme das Bandende erreicht wird, wird das Band automatisch zum Bandanfang zurückgespult und dann gestoppt. Beim Rückspulen leuchtet die REW-Anzeige, und wenn das Band den Bandanfang erreicht, leuchtet die STOP-Anzeige.

Hinweis: Normale Aufnahme ist nicht möglich, wenn der VIDEO SYSTEM-Schalter nicht richtig eingestellt ist.

Pause und zusammengesetzte Aufnahmen

Für kurzzeitigen Aufnahmestopp und zum unmittelbaren Anfügen der neuen Aufnahme an die vorige die PAUSE/STILL-Taste auf die folgende Weise verwenden. So werden gut zusammengesetzte Aufnahmen mit unbedeutenden Verzerrungen zwischen den einzelnen Segmenten hergestellt.

1. Während der Aufnahme die PAUSE/STILL-Taste drücken. Die Aufnahme-Betriebsart wird freigegeben (die REC-Anzeige leuchtet weiterhin), und das Band stoppt in der Pause-Betriebsart, nachdem es automatisch um etwa 2 Sekunden Programmzeit zurückgespult wurde.
2. Die PLAY-Taste drücken, um die Aufnahme wieder zu starten. Zuerst schaltet sich die Wiedergabe-Betriebsart ein (das Ausgangssignal ist jedoch nicht das Band-Wiedergabesignal, sondern das Eingangssignal für die Aufnahme). Wenn die Wiedergabe den Punkt erreicht, wo die vorige Aufnahme durch Drücken der PAUSE/STILL-Taste gestoppt wurde (nach etwa 2 Sekunden), wird die Wiedergabe-Betriebsart automatisch in die Aufnahme-Betriebsart umgeschaltet.



Hinweis:
Wenn das Gerät länger als 2 bis 3 Minuten auf Pause geschaltet bleibt, wird die Band-Zugspannung zum Schutz des Bandes automatisch reduziert. Wenn die Aufnahme aus diesem Zustand heraus gestartet wird, kann für die Dauer von einigen Bildern das normale Bild nicht aufgenommen werden. Daher wird empfohlen, die Aufnahme innerhalb dieser 2-bis-3-Minuten-Periode wieder zu starten.

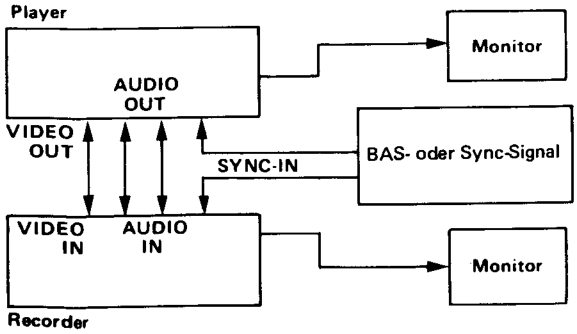
Aufnahmestart aus der Standbild-Betriebsart
Wenn auf einem bereits bespielten Band eine neue Aufnahme genau an einem bestimmten Punkt beginnen soll, wie folgt vorgehen:

1. Bei der Wiedergabe die Stelle suchen, an der die nächste Aufnahme beginnen soll. An diesem Punkt die PAUSE/STILL-Taste drücken. Auf dem Monitorschirm erscheint ein Standbild.
2. Zuerst die REC-Taste drücken. Dann die PLAY-Taste drücken, während die REC-Taste gedrückt gehalten wird. Das Band wird zuerst um etwa 2 Sekunden Programmzeit zurückgespult, dann schaltet das Gerät auf Wiedergabe.
3. Wenn die Wiedergabe den Punkt erreicht, an dem die PAUSE/STILL-Taste gedrückt wurde, startet die Aufnahme automatisch.

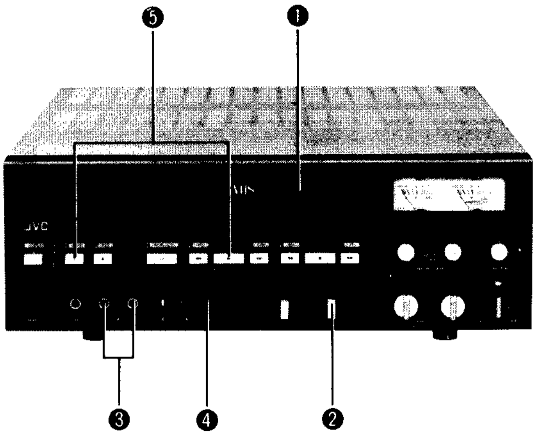
Hinweis:
Diese Schnittmethode ist kein "Insert-Schnitt". Wenn das Band alte Aufnahmen enthält, die der neu angehängten Aufnahme folgen, weist der Übergang zwischen dem Stück der neuen Aufnahme und der vorherigen Aufnahme Störungen auf.

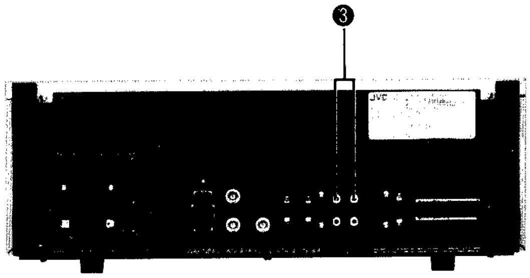
Aufnahme des Band-Wiedergabesignals (Bandkopieren)

1. Player und Recorder wie abgebildet anschließen.
2. Wenn der Player mit einem externen Sync-Signal synchronisiert werden soll, den PB SELECT-Wahlschalter des Players auf EXT stellen.
3. Den INPUT-Schalter des Recorders auf LINE stellen.
4. Den Player auf Wiedergabe und den Recorder auf Aufnahme schalten.



NACHVERTONUNG



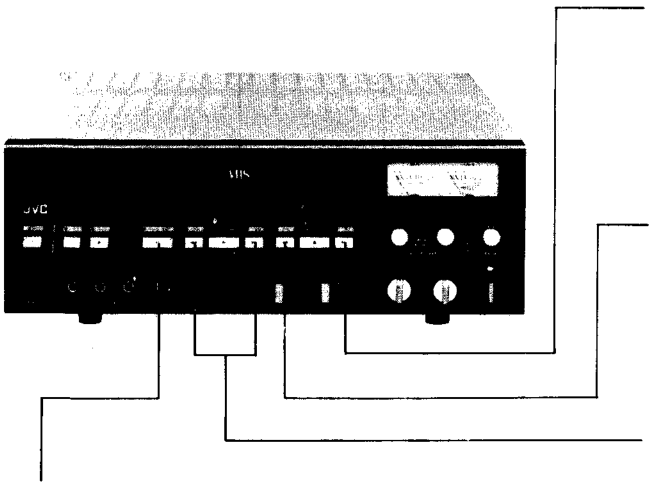


Zur Aufnahme von Ton während der Wiedergabe des vorher bespielten Bandes wie folgt vorgehen:

❶ Die bespielte Cassette einlegen.
❷ Den INPUT-Schalter auf LINE stellen.
❸ Eine Tonquelle wie erforderlich anschließen.
❹ Abhängig vom Kanal, auf dem aufgenommen werden soll, den AUDIO DUB-Wahlschalter auf CH-1 oder CH-2 stellen.
❺ Die A. DUB- und die PLAY-Taste gleichzeitig drücken.

- Wenn ein Mikrofon angeschlossen ist, werden die Quellen vom AUDIO IN-Anschluß und von der MIC-Buchse gemischt aufgenommen.

WEITERE FUNKTIONEN



SCHNELLVORLAUF

Zum Schnellvorlauf des Bandes die FF-Taste drücken. Wenn die FF-Taste während Wiedergabe oder Standbild gedrückt wird, wird das Band in die Cassette zurückgezogen und dann vorgespult. Beim Zurückziehen des Bandes in die Cassette blinken die FF- und die STOP-Anzeige und zeigen damit an, daß der Befehl für Schnellvorlauf gespeichert ist.

RÜCKSPULEN

Zum Rückspulen des Bandes die REW-Taste drücken. Wenn die REW-Taste während Wiedergabe oder Standbild gedrückt wird, wird das Band in die Cassette zurückgezogen und dann zurückgespult. Beim Zurückziehen des Bandes in die Cassette blinken die REW- und die STOP-Anzeige und zeigen damit an, daß der Befehl für Rückspulen gespeichert ist.

BILDSUCHLAUF

Der Bildsuchlauf ermöglicht, jede Bandstelle schnell zu finden, während das Wiedergabebild auf dem Monitorschirm betrachtet wird. Die Bandgeschwindigkeit beträgt etwa das Zehnfache der normalen Geschwindigkeit, der Bildsuchlauf ist in beiden Richtungen möglich, entweder vorwärts oder rückwärts.

- Zuerst auf Wiedergabe schalten und dann, abhängig von der Richtung, in der sich die gesuchte Stelle befindet, entweder die REV- oder die FWD-Bildsuchlauf-Taste drücken. Wenn die gesuchte Szene erscheint, abhängig von der gewünschten nächsten Wiedergabeart die PLAY- oder die PAUSE/STILL-Taste drücken.

STANDBILD-WIEDERGABE und PAUSE

Zuerst durch Drücken der PLAY-Taste auf Wiedergabe schalten und dann die PAUSE/STILL-Taste drücken. Die PAUSE/STILL-Anzeige leuchtet, das Bild wird augenblicklich "eingefroren".
Zur Freigabe des Standbildes die PLAY-Taste drücken.
Beziehen Sie sich auf den Abschnitt "AUFNAHME" (Seite 39) für Verwendung der Pause-Funktion bei der Aufnahme.

Hinweis:
Wenn während der Wiedergabe die PAUSE/STILL-Taste gedrückt gelassen wird, verschwindet das normale Standbild nach 2 oder 3 Minuten. Dies beruht darauf, daß die Zugspannung zum Schutz des Bandes automatisch reduziert wird, und läßt nicht auf einen Defekt des Gerätes schließen.

STÖRUNGSSUCHE

Was zuerst wie eine Störung erscheint muß nicht immer ernsthaft sein. Bevor Sie sich an Ihren JVC-Fachhändler wenden, überprüfen Sie bitte . . .

Störung	Bitte prüfen Sie
Aufnahme ist nicht möglich.	● Ist eine Cassette eingelegt? ● Sind die Anschlüsse korrekt? ● Ist der INPUT-Schalter richtig eingestellt? ● Ist die Sicherheitszunge der Cassette herausgebrochen?
Schnee im Bild.	● Wenn für Wiedergabe ein Fernsehempfänger verwendet wird, überprüfen, ob der Kanalwähler des Fernsehempfängers auf den Kanal des HF-Modulators eingestellt wurde. ● Den TRACKING-Regler langsam drehen, bis das Bild klar wird.
Band stoppt unerwartet.	● Die Einstellung des MEMORY-Schalters überprüfen.
Nachvertonung ist nicht möglich.	● Ist der A. DUB-Schalter richtig eingestellt? ● Ist die Sicherheitszunge der Cassette herausgebrochen?
Akustische Rückkopplung.	● Mikrofone weiter vom Fernseher entfernen. ● Die Lautstärke des Fernsehers verringern.
Keine Anzeige am Audio-Meßinstrument für Kanal 2.	● Überprüfen, ob der Meßinstrument-Funktionswahlschalter auf die Position für Tracking-Meßinstrument eingestellt ist.

Hinweis: Wenden Sie sich an Ihren JVC-Fachhändler, wenn die POWER-Anzeige blinkt.

TECHNISCHE DATEN

ALLGEMEIN

Format : VHS 1/2" (12,65 mm)
Spannungsversorgung : 100/120/220/240 V∿, 50/60 Hz
Leistungsaufnahme : 76 Watt (mit der Automatischen Schnittsteuerungseinheit, 12 V ⎓ , 0,55 A)
Abmessungen : 44,0(B) x 16,4(H) x 44,8(T) cm
Gewicht : 17,9 kg
Betriebstemperatur : 5° C bis 40° C
Lagerung : -20° C bis 60° C
Betriebslage : Nur horizontal
Bandgeschwindigkeit : 23,39 mm/Sek. (PAL/SECAM)
33,35 mm/Sek. (NTSC)
Suchlauf-Geschwindigkeit : Bildsuchlauf Vorwärts/Rückwärts
±10X Variabel 0 ~ ±5X, ±10X

VIDEO

Aufnahme- und Wiedergabe-System : Rotierendes Zweikopfsystem, Schrägspurabtastung mit im Winkel versetzten Köpfen
Leuchtdichte : FM-Aufnahme
Farbe : Phasenverschiebung und Direktaufnahme durch umgesetzten Hilfsträger
Videosignalsystem : Aufnahme: PAL/SECAM
Wiedergabe: PAL/SECAM/NTSC
4,43 MHz
Eingang Line/TV : 0,5 bis 2,0 Vs-s, 75 Ohm, unsymmetrisch
Störspannungsabstand : Monochrom: 43 dB
(Rohde und Schwarz Geräuschmesser)
Horizontale Auflösung : Monochrom: 250 Zeilen (PAL)
240 Zeilen (SECAM)
Sync-Eingang : 0,5 bis 4,0 Vs-s, 75 Ohm, unsymmetrisch
Eingangswahl : TV/LINE
Sync-Wahl : INT/EXT

AUDIO

Eingang Line : -6/-20 dBs (wählbar), 10 kOhm, unsymmetrisch (CH-1/CH-2)
Mikrofon : -70 bis -60 dBm, 600 Ohm, unsymmetrisch
TV : -20 dBs, 10 kOhm, unsymmetrisch
Ausgang Line : -6 dBs, an 10 kOhm, unsymmetrisch
Monitor : 0 dBs, an 10 kOhm, unsymmetrisch (CH-1/MIX/CH-2)
Kopfhörer : HIGH/MED/LOW 8 bis 300 Ohm, unsymmetrisch
TV : 0 dBs, niedrigohmig, unsymmetrisch
Störspannungsabstand : Mehr als 47 dB (NR eingeschaltet), 42 dB (NR ausgeschaltet)(bei 3 % Klirrfaktor)
Frequenzgang : 40 bis 12.000 Hz
Eingangswahl : TV/LINE
Monitor-Ausgangswahl : CH-1/MIX/CH-2
Nachvertonungswahl : CH-1/CH-2

ANSCHLÜSSE

Video-Eingang/Ausgang : BNC
Sync-Eingang : BNC
HF-Ausgang : Antenne
TV-Eingang/Ausgang : EIAJ 8 pol. TV-Stecker
Audio
Line-Eingang/Ausgang : RCA-Stiftstecker
Mikrofon : 6-mm-Buchsen
Monitor-Ausgang : DIN 5 pol.
Kopfhörer : 6-mm-Buchse
Fernbedienung : 45 pol. Anschluß
Netzeingang : 3 pol. Netzanschluß
Zubehör : 1 Satz

---

* Dolby ist ein Warenzeichen der Dolby Laboratories Licensing Corporation.

Technische Änderungen vorbehalten.

BP-5300TR

INSTRUCTIONS
MANUEL D'INSTRUCTIONS
BEDIENUNGSANLEITUNG

For reference, the text of the instruction booklet of this model is reproduced in the following pages.
Numbering of the pages also corresponds with that of the booklet.

BP-5300TR
COLOR VIDEO CASSETTE PLAYER

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

WARNING–DANGEROUS VOLTAGE INSIDE

CAUTION
Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial, prior to replacing the fuse, and prior to altering the voltage setting.

POWER SYSTEM
Connection to the mains supply
The operating voltage of this set is preset to 240 V∿ at the factory.
Before connecting to mains, check that the voltage selector on the rear panel is set to the same voltage as your local mains supply.

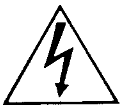
Adapting to local power line
This set operates on either 100, 120, 220 or 240 V∿.
If the preset voltage is different from the power line voltage in your area, reset the voltage selector by inserting a screwdriver into the slot of the voltage selector and turning it until the correct voltage is displayed.

Warning Notice
FOR YOUR SAFETY (Australia)
1. Insert this plug only into effectively earthed three-pin power outlet.
2. If any doubt exists regarding the earthing, consult a qualified electrician.
3. Extension cords, if used, must be three-core correctly wired.

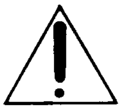
NOTE:
The rating plate (serial number plate) is on the rear of the unit.

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK.
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

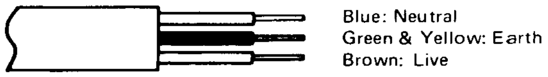


The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

IMPORTANT (In the United Kingdom)
Mains Supply (AC 240 V∿, 50 Hz only)

WARNING – THIS APPARATUS MUST BE EARTHED

The wires in this mains lead are coloured in accordance with the following code:



As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows. The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the safety earth symbol ⏚ or coloured GREEN or GREEN-AND-YELLOW. The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or which is coloured BLACK. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

CONTENTS

Precautions 2
Features 2
Controls and connectors 3
Connection example 6
RF converter installation 8
Loading and unloading the video cassette 8
Playback 9
  Normal playback 9
  External-lock playback 9
  Repeat playback 9
Convenient facilities 10
In case of difficulty 10
Specifications 11

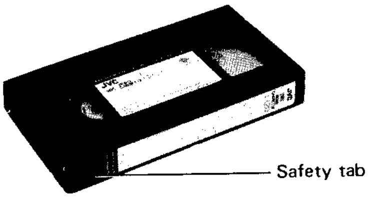
PRECAUTIONS

Handling and storage

- Avoid using the BP-5300TR under the following conditions:
  - – extremely hot, cold or humid places,
  - – dusty places,
  - – near appliances generating strong magnetic fields,
  - – places subject to vibration, and
  - – poorly ventilated places.
- Be careful of moisture condensation.
  Avoid using the BP-5300TR soon after moving from a cold place to a warm place or soon after heating a room which was cold. Water vapor in the warm air will condense on the still-cold video head drum and tape guides and this moisture may cause damage to the tape and the player.
- Handle the BP-5300TR carefully.
  - Do not block the ventilation openings.
  - Do not place anything heavy on the player.
  - Do not place anything which might spill and cause internal damage on top of the player.
  - Use in horizontal (flat) position only.
- In case of transportation,
  - Avoid violent shocks to the player during packing and transportation.
  - Before packing, be sure to remove the cassette from the player.

Video cassettes

- The BP-5300TR employs VHS type cassettes only.
  E-type PAL/SECAM tapes and T-type NTSC tapes can be played back.
- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or a magnet) and dusty places.
- Place the cassettes in cassette cases and position vertically.



CAUTION

If for some reason it becomes necessary for you to turn the POWER switch to ON after having switched it OFF, do not do so immediately. Allow a period longer than 2 seconds to elapse, otherwise it might happen that the cassette will be ejected or the unit becomes inoperative with the POWER LED indicator flashing. If this happens, set the POWER switch to OFF and, after a period longer than 2 seconds, set the POWER switch once again to ON.

CAUTION

It may be necessary to periodically check this video cassette player depending on how you use it. If required, consult a JVC service dealer.

VHS

Only cassettes marked "VHS" can be used with this video cassette player.

COPYRIGHT © 1982 VICTOR COMPANY OF JAPAN, LTD.

FEATURES

Triple-system playback

For flexibility, the BP-5300TR can play back PAL, SECAM and 4.43 MHz NTSC signals.

Direct drive system

The head drum is directly driven by a servo-controlled brushless DC motor, while the capstan and reels are all driven directly by independent DC motors, assuring minimal jitter, stable pictures and more reliable operation.

Aluminum diecast chassis for heavy-duty use

Rugged and durable aluminum diecast chassis supports the long-term and demanding use of the BP-5300TR for institutional applications.

Motorized automatic front cassette loading

Simply insert a video cassette slightly into the front panel slot and the loading motor moves the cassette automatically and quietly so that it is properly positioned for operation.

4-head system

The BP-5300TR uses two pairs of video heads, one pair for normal playback and the other for slow-motion, still picture and search playback. As well as achieving high-quality playback, this results in stable still, slow and fast playback.

Microprocessor-based full-logic control

As well as allowing feather-light touch operation and direct mode change, full remote control of all operational modes is also possible.

Shuttle search at 10 times normal speed

Run the tape at a speed about 10 times normal in either direction to locate the scene you wish to view fast and accurately.

Variable-speed playback from still to 5 times normal

When the BP-5300TR is controlled from an appropriate remote control unit, the tape playback speed can be varied continuously from still to 5 times normal in both forward and reverse directions.

Capstan servo and external sync capability

Since it incorporates a capstan servo and accommodates external reference signals to which its playback can be locked, the BP-5300TR can adapt well to any existing video system.

Two-channel audio system

Two audio tracks enable bilingual presentations.

Audio playback level meters

A level meter is provided for each of the two audio channels for indicating the audio level during playback.

Tracking meter

The channel-2 audio level meter can be switched into a tracking meter so that precise tracking alignments can be made for critical playback.

Hi-Fi sound reproduction

The advanced audio circuit ensures excellent sound reproduction, that's also supported by the built-in Dolby* noise reduction system, allowing high-fidelity listening pleasure, too.

Flexible search and repeat functions

Counter search, full repeat, counter repeat and automatic rewind at tape end are all provided.

Electronic tape counter/lap time indicator

The built-in 4-digit tape counter doubles as a 5-digit lap time counter by switching it.

Optional remote control units

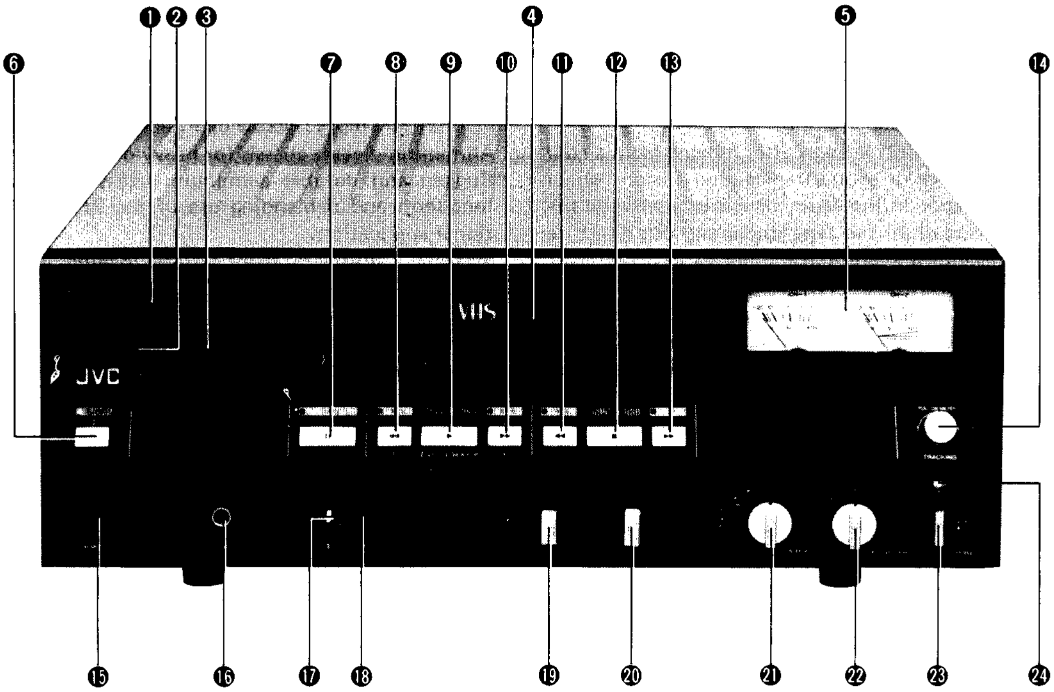
A choice of compact remote control units are available; a wireless remote control unit and a connectable remote control unit.

Editing control interfacing

For more elaborate editing, direct interfacing with JVC's Automatic Editing Control Unit is possible, enabling 1/2"-to-3/4" edits to be made quickly and accurately.

CONTROLS AND CONNECTORS

Front panel



❶ **Electronic tape counter/Lap time counter**
This fluorescent display functions as a 4-digit tape counter or a 5-digit lap time indicator depending on the setting of the display mode select swtich ❷ . While the tape is being wound in the forward direction, the counter reading advances in the direction of increasing numbers. While the tape is being wound in the reverse direction, the counter reading changes in the direction of decreasing numbers and after zero a "minus" sign appears.

❷ **Display mode select button (TAPE/LAP)**
The fluorescent display functions as a tape counter with this button in its "out" position. When the button is pressed in, the display changes into a lap time counter.
To change back to the tape counter, press the button once again.
TAPE: Counting up to ±9999.
LAP: Counting up to ±9 hours, 59 minutes, 59 seconds.

❸ **Counter reset button (RESET)**
Press to reset the tape or lap time counter to zero.

❹ **Cassette loading slot**
With the POWER switch set to ON, insert a video cassette with its labelled edge facing toward you. The cassette carriage itself will automatically take control and retract the cassette into the correct loaded position.

❺ **Audio playback level meters/Tracking meter**
These meters indicate the audio level during playback. The CH-2 meter is switched to a tracking meter when the TRACKING control/Meter function select switch ⓮ is pulled to its "out" position.

❻ **EJECT button**
Press to eject the cassette. This button can be pressed in the Stop mode or immediately after the STOP button has been pressed. The EJECT indicator will be flashing during automatic unloading of the cassette and then remain lit upon completion of ejection.

❼ **STILL button**
Press to stop the tape temporarily. When this button is pressed during playback or shuttle search, a still picture appears immediately with the PAUSE/STILL indicator lighting. The Still mode is released by pressing the PLAY button ❾ .

❽ **Reverse search button (REV) — (Shuttle search)**
Pressing this button in the Play or Still mode enables high-speed playback at about 10 times normal in the reverse direction. During search, the REV indicator will light. To release this Search mode, press the PLAY, FF, REW, STILL, STOP or FWD button depending on the mode you want to select next.

❾ **PLAY button**
When this button is pressed, the tape is loaded around the tape transport mechanism and the Play mode is engaged. During loading, the PLAY indicator will flash and, after completion of loading, it will remain lit continually during the Play mode.

❿ **Forward search button (FWD) — (Shuttle search)**
Pressing this button in the Play or Still mode enables high-speed playback at about 10 times normal in the forward direction. During search, the FWD indicator will light. To release this Search mode, press the PLAY, FF, REW, STILL, STOP or REV button depending on the mode you want to select next.

⓫ **Rewind button (REW)**
Press to rewind the tape inside the cassette. While the tape is being rewound, the REW indicator will light. This button can be pressed in any mode except Eject. To release the Rewind mode, press the PLAY, STOP or FF button depending on the mode you want to select next.

⑫ **STOP button**
Press to unload and stop the tape. This button has priority over all other buttons. During unloading of the tape into the cassette, the STOP indicator will flash and, after unloading, it will remain lit.

⑬ **Fast forward button (FF)**
Press to fast forward the tape inside the cassette. While the tape is being fast forwarded, the FF indicator will light. This button can be pressed in any mode except Eject. To release the Fast Forward mode, press the PLAY, STOP or REW button depending on the mode you want to select next.

⑭ **Tracking control/Meter function select switch (TRACKING)**
If noise bars appear on the screen, adjust tracking by using this control. First pull the knob outward to switch the CH-2 audio level meter to a tracking meter and turn the knob so that the meter needle makes its maximum deflection to the right.

⑮ **7-pin remote control terminal (REMOTE) (7-pin DIN)**
A JVC exclusive remote control unit may be connected to this terminal. A wireless remote control unit is also available from JVC. When using the wireless remote control unit, this terminal accepts a receiver which is supplied with the remote control unit.

⑯ **Headphone jack (PHONES) (6 mmϕ)**
Connect a set of stereo headphones having an impedance of 8 – 300 ohms. The audio channel selected by the AUDIO MONITOR switch ⑲ can be listened to. The output level is switchable among low, normal and high by the rear panel PHONES LEVEL switch ㊱ .

⑰ **Audio noise reduction indicator (NR INDICATOR)**
This LED lights when the AUDIO NR switch ⑱ is set to ON.

⑱ **Audio noise reduction switch (AUDIO NR)**
Set to ON to activate the built-in Dolby* noise reduction system to reduce tape hiss.

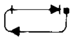
⑲ **AUDIO MONITOR output select switch**
This switch selects the audio output available at the 8-pin TV connector ㉚ , headphone jack ⑯ or AUDIO MONITOR connector ㉟ .

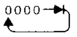
CH-1: To hear channel-1 audio.
CH-2: To hear channel-2 audio.
MIX: To hear both channel-1 and channel-2 audio together.

⑳ **VIDEO MODE select switch**
COLOUR: Set to this position when the playback video signal is in colour.
AUTO. The circuit is automatically switched for colour and black/white by detecting the colour burst signal. This position is sufficient for most purposes.
B/W: Set to this position when the playback video signal is monochrome.

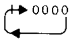
㉑ **Tape MEMORY switch**
Automatic repeat playback of specific sections on the tape or automatic search to the counter reading of "0", etc. is possible.

SEARCH: The tape stops at the counter reading of "0000" during FF or REW mode.
OFF : Set to this position when you are not using any of these memory functions.


: The tape will be automatically rewound at its end (as usual) and played back repeatedly when it reaches its beginning. The entire tape can be played back again and again automatically.



: In this position, repeated playback from the counter reading of "0000" to the tape end is possible.



: In this position, repeated playback from the beginning of the tape to the counter reading of "0000" is possible.

Note:
The marks for switch positions indicate a 4-digit figure (0000). However, the actual counter indication for zero is a 1-digit figure (0).

㉒ **VIDEO SYSTEM select switch**
SECAM: Set to this position when you are going to play back SECAM signals.
PAL: Set to this position when you are going to play back PAL signals.
MODIFIED NTSC: Set to this position when you are going to play back NTSC tapes. (A TV monitor with built-in 4.43 MHz NTSC decoder is necessary.)

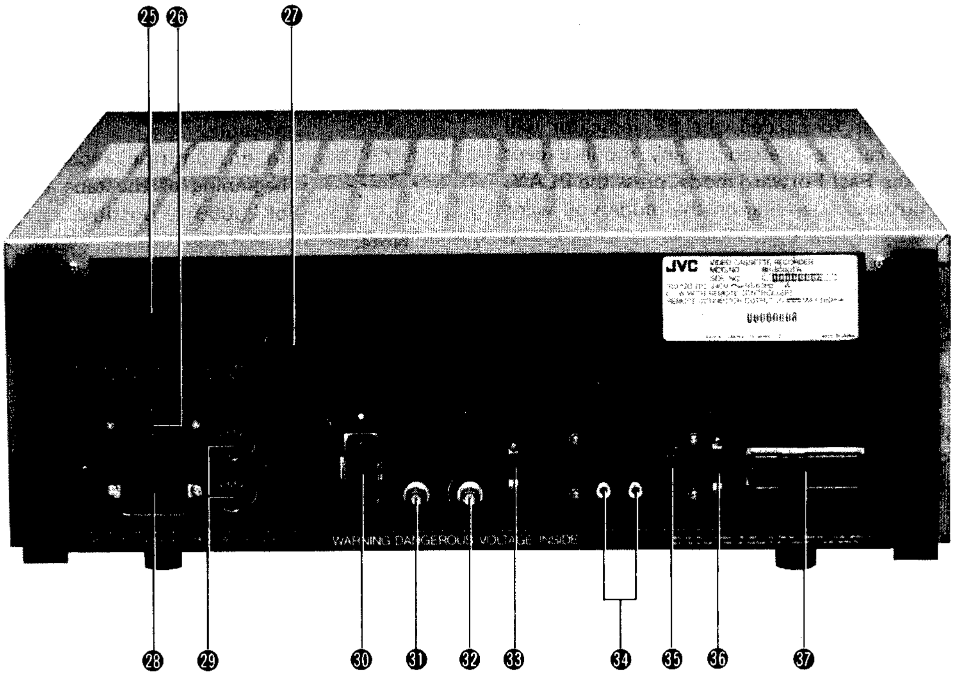
㉓ **POWER switch**

㉔ **POWER (and warning) indicator**
This LED lights when power is on. If the tape running is in some way incorrect, this indicator starts flashing.
The causes may be:
(1) the moisture condensation sensor is in operation,
(2) the tape-end sensor lamp has blown out,
(3) the head drum does not rotate,
(4) the eject mechanism does not operate properly,
(5) the automatic loading and unloading mechanism does not operate properly, or
(6) the tape stops running.
The indicator flashes at a rate of about twice per second in the case of (1) and about once per second in the other five cases.

---

*Dolby is a trademark of Dolby Laboratories Licensing Corporation.

Rear panel



㉕ **RF converter compartment**

㉖ **Voltage selector**
Set to the power supply voltage in your area. See page 1.

㉗ **RF output connector (RF OUT)**
Connect to the aerial terminal of a TV receiver through the aerial cable.

㉘ **AC input socket**

㉙ **Fuse holders**

㉚ **TV monitor connector (TV) (8-pin)**
This is an 8-pin output connector for the connection of a TV monitor. The audio signal selected by the AUDIO MONITOR switch ⑲ is present at the audio output terminal.

㉛ **Video line output connector (VIDEO OUT) (BNC-type)**
Line output connector for the video signal.

㉜ **External sync signal input connector (SYNC) (BNC-type)**
This is an input connector to accept an external reference sync signal when the player is to be operated in the external sync mode. The external sync signal can be a composite sync signal or composite video signal.

㉝ **Playback sync select switch (PB SYNC)**
Set to EXT when the playback is to be locked to an external sync signal.

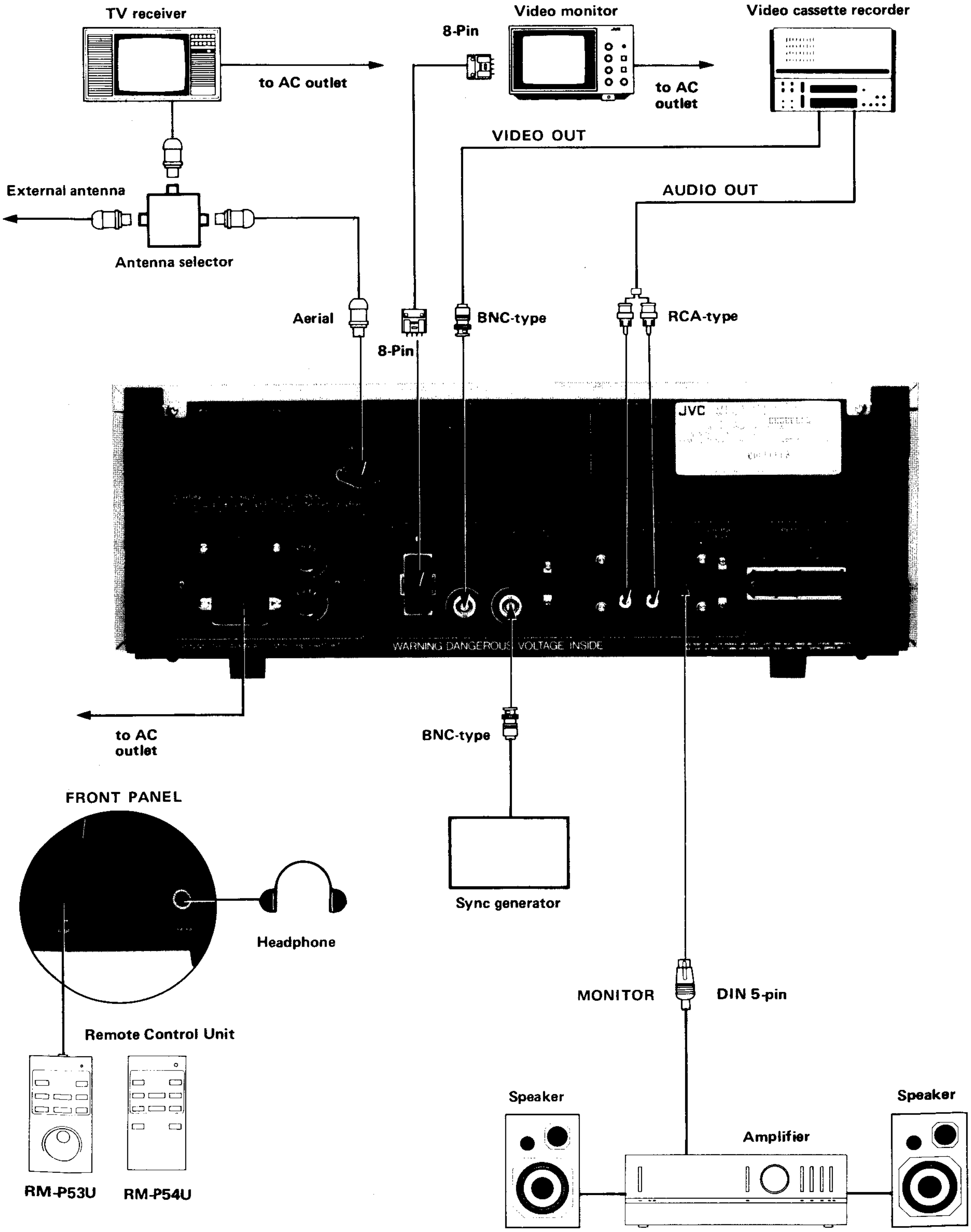
㉞ **Audio line output connectors (AUDIO OUT CH-1, CH-2) (RCA-type)**
Line output connectors for the audio signals of channel-1 and channel-2.

㉟ **Audio monitor output connector (AUDIO MONITOR) (DIN 5-pin)**
The audio signal selected by the AUDIO MONITOR switch ⑲ is available.

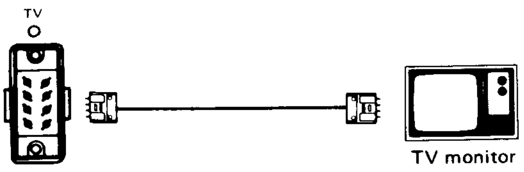
㊱ **Headphone level select switch (PHONES LEVEL)**
The output level of the headphone jack ⑯ can be selected in three steps (HIGH, MED, LOW).

㊲ **Remote control connector (REMOTE) (45-pin)**
Connect a JVC remote control unit.

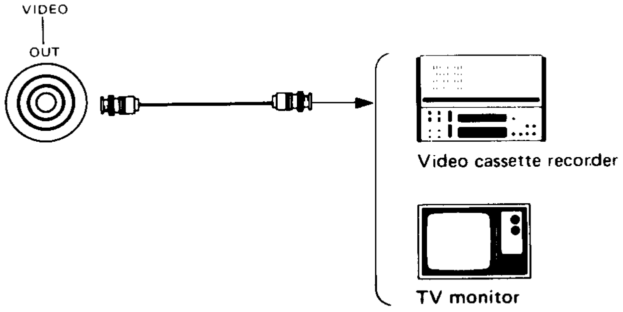
CONNECTION EXAMPLE


TV receiver
to AC outlet
8-Pin
Video monitor
to AC outlet
Video cassette recorder
VIDEO OUT
External antenna
AUDIO OUT
Antenna selector
Aerial
8-Pin
BNC-type
RCA-type
JVC
WARNING DANGEROUS VOLTAGE INSIDE
to AC outlet
BNC-type
FRONT PANEL
Sync generator
Headphone
MONITOR
DIN 5-pin
Remote Control Unit
Speaker
Speaker
Amplifier
RM-P53U
RM-P54U

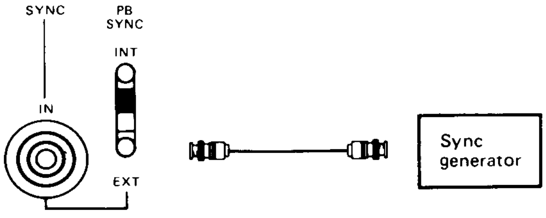
1. TV connector (8-pin)


TV
TV monitor

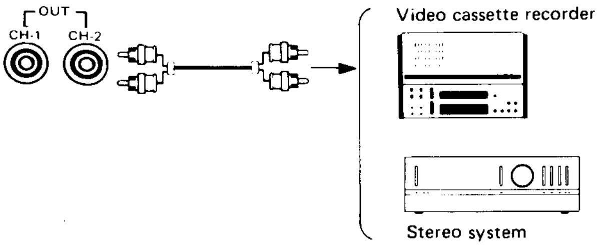
2. VIDEO OUT connector (BNC)


VIDEO
OUT
Video cassette recorder
TV monitor

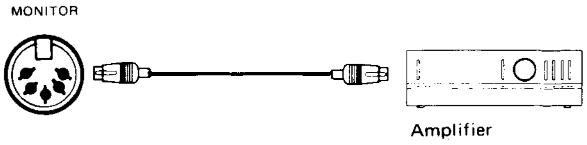
3. SYNC IN connector (BNC)


SYNC
PB SYNC
INT
IN
EXT
Sync generator

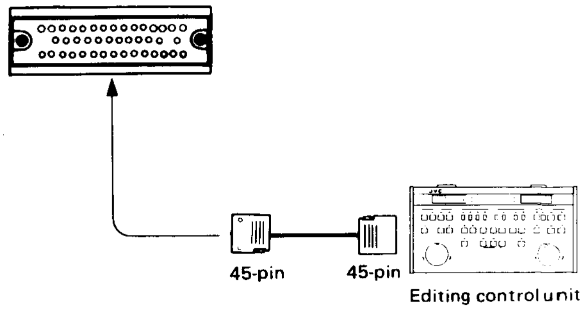
4. AUDIO OUT connector (RCA)


OUT
CH-1
CH-2
Video cassette recorder
Stereo system

5. AUDIO MONITOR (DIN)


MONITOR
Amplifier

6. REMOTE control connector (45-pin)


45-pin
45-pin
Editing control unit

RF CONVERTER INSTALLATION

- If it is necessary to install an RF converter, remove the RF converter compartment cover by loosening the two screws. For an appropriate RF converter model, consult a JVC dealer.

We recommend to use an appropriate RF converter having one of the specified part numbers below:

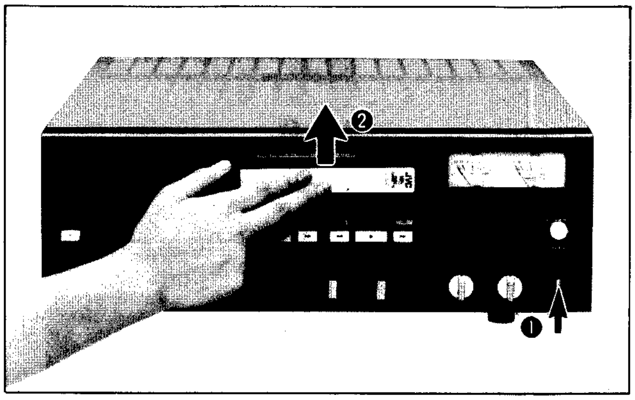
PU54120 for PAL system G
PU54121 for PAL system I
PU54122 for SECAM system L
PU54123 in Australia

Note:
When using this video player in areas covered by regulations regarding electromagnetic waves, it is not permitted for RF converters other than those listed above to be employed.

LOADING AND UNLOADING THE VIDEO CASSETTE

Loading

❶ Press the POWER switch to ON. The EJECT indicator will flash.

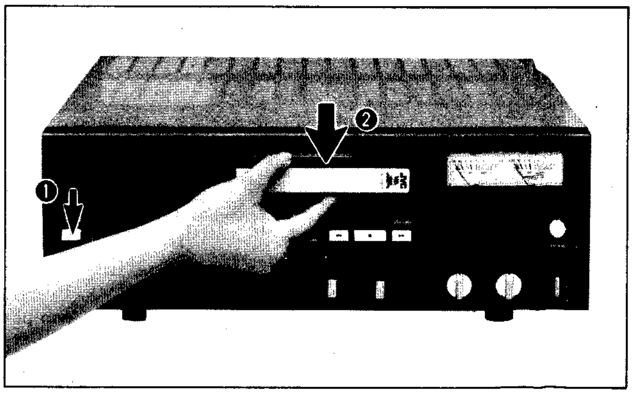


❷ After the EJECT indicator stops flashing and remains lit, insert a cassette with its labelled side facing you. The cassette will automatically be retracted and loaded in the correct position.

- The STOP indicator will be flashing during automatic loading of the cassette and, when it has been correctly loaded, will remain lit.
- The automatic loading mechanism will operate only when the cassette is inserted correctly.
- If loading does not result in positioning the cassette correctly, it will automatically be ejected after about 6 seconds.

Unloading

❶ Press the EJECT button in the Stop mode. The cassette will automatically be ejected.



❷ Remove the cassette from the cassette loading slot.

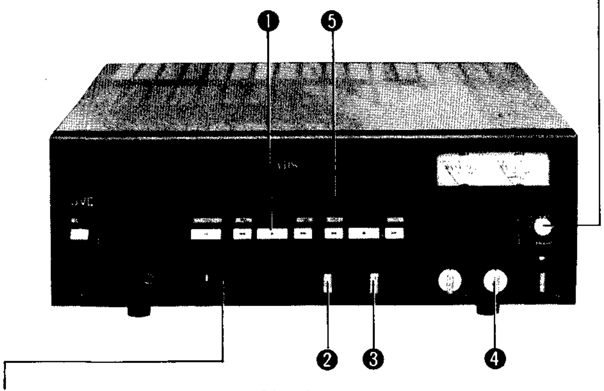
- The EJECT indicator will be flashing during automatic unloading of the cassette and then remains lit upon completion of ejection.
- The EJECT button can be pressed immediately after the STOP button has been pressed. The logic circuit will memorize the sequence; first engaging the player in the Stop mode and then automatically changing it into the Eject mode.

PLAYBACK

Normal playback

❶ Load a recorded cassette.
❷ Set the AUDIO MONITOR switch as required.

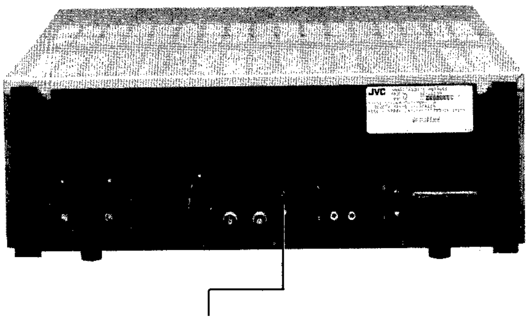
If noise bars appear on the screen, adjust the TRACKING control to optimize the picture.



Set the AUDIO NR switch to ON, if you play back noise-reduced tapes.

❸ Set the VIDEO MODE switch as required.
❹ Set the VIDEO SYSTEM switch as required.
❺ Press the PLAY button to start playback. The tape is first loaded onto the tape transport mechanism and then playback begins. During tape loading, the PLAY indicator is flashing and, after completion of loading, remains lit.

External-lock playback



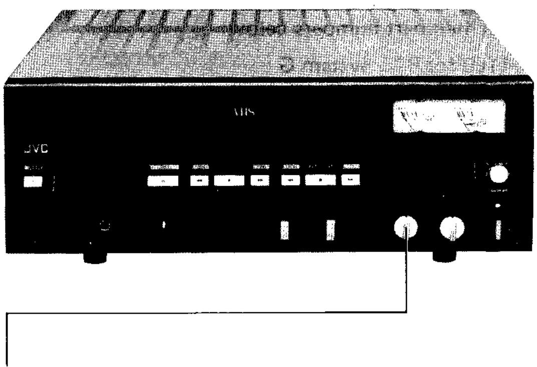
PB SYNC
Set to EXT when the playback is to be locked to an external sync signal. (Use a composite sync signal or a composite video signal as the reference sync signal.)

Note:

- When the tape reaches its end during playback, it is automatically unloaded from the tape transport mechanism, enters the Rewind mode and stops at the beginning of the tape.

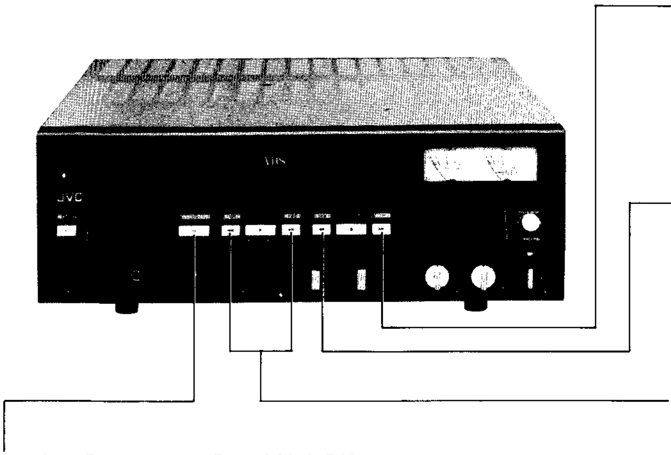
Repeat playback

Three different repeat functions are available depending on the setting of the tape MEMORY switch.



↻	To repeat the entire tape again and again.
0000→	To repeat the section from the counter reading of zero to the tape end.
→0000	To repeat the section from the beginning of the tape to the counter reading of zero.

CONVENIENT FACILITIES



STILL-PICTURE PLAYBACK

After engaging the Play mode by pressing the PLAY button, press the STILL button. The STILL indicator will light and the picture will "freeze" instantly.

To release the Still mode, press the PLAY button.

Note:

If you leave the STILL button pressed during playback, the normal still picture will be lost after 2 or 3 minutes. This is because the tape tension is automatically reduced to protect the tape, and not due to any defect of the unit.

FAST FORWARD

To fast forward the tape, press the FF button. When the FF button is pressed in the Play or Still mode, the tape is unloaded and the Fast Forward mode is entered. During unloading, the FF and STOP indicators flash, showing that the Fast Forward mode is held in memory.

REWIND

To rewind the tape, press the REW button. When the REW button is pressed in the Play or Still mode, the tape is unloaded and the Rewind mode is entered. During unloading, the REW and STOP indicators flash, indicating that the Rewind mode is held in memory.

SHUTTLE SEARCH

The unique shuttle search function permits you to reach quickly your desired tape section while following the playback picture on the monitor screen. The tape speed is about 10 times normal and "search for a scene" is possible in both directions, either forward or reverse.

- After engaging the Play mode, press either one of the shuttle search buttons REV or FWD depending on the direction in which you are going to search for a particular scene. When your desired scene appears, press the PLAY or STILL button, depending on the mode you need.

IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Prior to consulting a JVC service dealer, make sure first . . .

Symptoms	Check points
Snowy picture.	● When using a TV receiver for playback, check to see if you have set the channel selector of the TV receiver to the channel of the RF converter. ● Turn the TRACKING control slowly until the picture clears.
Tape stops unexpectedly.	● Check the setting of the MEMORY switch.
CH-2 audio level meter does not deflect.	● Check the setting of the meter function select switch to see if it is in the position for the tracking meter.

Note: If the POWER indicator should flash, consult a JVC service dealer.

SPECIFICATIONS

GENERAL

Format : VHS 1/2" (12.65 mm)
Power requirement : 100/120/220/240 V∿, 50/60 Hz
Power consumption : 76 watts (with the Automatic Editing Control Unit, 12 V ⎓ , 0.55 A)
Dimensions : 44.0(W) x 16.4(H) x 44.8(D) mm
Weight 17.5 kg
Operating temperature : 5° C to 40° C
Storage : -20° C to 60° C
Operating position : Horizontal only
Tape speed : 23.39 mm/sec (PAL/SECAM)
33.35 mm/sec (NTSC)
Search speed : Shuttle FWD/REV ±10X
Variable 0 ~ ±5X, ±10X

VIDEO

Playback system : Rotary two-head, helical scanning system
Video signal system : PAL/SECAM/NTSC 4.43
Output Line /TV : 1.0 Vp-p, 75 ohms, unbalanced
Signal-to-noise ratio : Monochrome: 43 dB
(Rohde and Schwarz noise meter)
Horizontal resolution : Monochrome: 250 lines (PAL),
240 lines (SECAM),
Sync input : 0.5 to 4 Vp-p, 75 ohms, unbalanced
Sync select : INT/EXT

AUDIO

Output Line : -6 dBs, into 10 k-ohms, unbalanced
Monitor : 0 dBs, into 10 k-ohms, unbalanced (CH-1/MIX/CH-2)
Headphone : HIGH/MED/LOW, 8 to 300 ohms, unbalanced
TV : 0 dBs, low impedance, unbalanced
Signal-to-noise ratio : More than 47 dB (NR-on), 42 dB (NR-off)(at 3 % distortion level)
Frequency response : 40 to 12,000 Hz
Monitor output select : CH-1/MIX/CH-2

CONNECTORS

Video output : BNC-type connector
SYNC input : BNC-type connector
RF output : Aerial
TV input/output : EIAJ 8-pin TV connector
Audio
Line output : RCA-type pin jacks
Monitor out : DIN 5-pin
Headphone : 6 mm jack
Remote control : 45-pin connector
AC in : 3-lead AC connector
Accessory : 1 set

Design and specifications subject to change without notice.

BP-5300TR
LECTEUR DE CASSETTE VIDEO

AVERTISSEMENT:

POUR EVITER LES RISQUES D'INCENDIE OU D'ELECTROCUTION, NE PAS EXPOSER L'APPAREIL A L'HUMIDITE OU A LA PLUIE.

ATTENTION

Tension dangereuse à l'intérieur. Se référer à un personnel qualifié en cas de problèmes. Pour éviter tout risque d'incendie ou d'électrocution, débrancher le cordon d'alimentation de la prise secteur avant de remplacer le fusible et avant de modifier le réglage de la tension.

SYSTEME D'ALIMENTATION

Branchement au réseau d'alimentation

La tension de fonctionnement de ce lecteur de cassette vidéo est réglée en usine sur 240 V∿.
Avant de brancher l'appareil à une prise secteur, s'assurer que le réglage du sélecteur de tension situé sur le panneau arrière corresponde bien à la tension secteur du réseau d'alimentation local.

Adaptation à la tension secteur locale

Cet appareil fonctionne aussi bien sur 100, 120 ou 220 volts que sur 240 volts, courant alternatif.
Si la tension préréglée est différente de celle de la tension secteur locale, régler le sélecteur de tension en introduisant un tournevis dans la fente du sélecteur de tension et en tournant jusqu'à ce que la tension convenable soit indiquée.

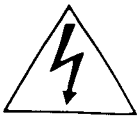
REMARQUE:

La plaque d'identification (numéro de série) se trouve sur le panneau arrière de l'appareil.

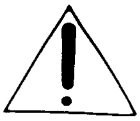
ATTENTION

RISQUE D'ELECTROCUTION
NE PAS OUVRIR

ATTENTION: POUR EVITER TOUT RISQUE D'ELECTROCUTION
NE PAS OUVRIR LE BOITIER.
AUCUNE PIECE INTERIEURE N'EST A
REGLER PAR L'UTILISATEUR.
SE REFERER A UN AGENT QUALIFIE EN CAS DE PROBLEME.



Le symbole de l'éclair à l'intérieur d'un triangle équilatéral est destiné à alerter l'utilisateur sur la présence d'un "voltage dangereux" non isolé dans le boîtier du produit. Ce voltage est de force suffisante pour provoquer l'électrocution de personnes.



Le point d'exclamation à l'intérieur d'un triangle équilatéral est destiné à alerter l'utilisateur sur la présence d'opérations d'entretien importantes au sujet desquelles des renseignements se trouvent dans le manuel d'instructions.

*Ces symboles ne sont utilisés qu'aux Etats-Unis.

VHS

Seules les cassettes marquées VHS peuvent être utilisées sur ce lecteur de cassette vidéo.

© 1982 par VICTOR COMPANY OF JAPAN, LTD.

SOMMAIRE

Précautions à observer 12
Caractéristiques générales 13
Commandes et connecteurs 14
Exemple de raccordement 17
Installation du convertisseur HF 19
Chargement et déchargement d'une cassette vidéo 19
Lecture 20
  Lecture normale 20
  Lecture à verrouillage externe 20
  Lecture répétée 20
Dispositifs pratiques 21
En cas de difficulté 21
Caractéristiques techniques 22

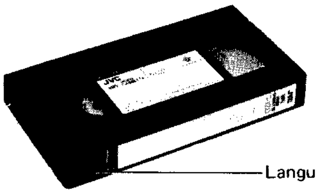
PRECAUTIONS A OBSERVER

Maniement et stockage

- Eviter d'utiliser le BP-5300TR dans les conditions suivantes:
  - dans les endroits soumis à des températures extrêmes de chaleur, de froid ou à l'humidité.
  - dans les endroits poussiéreux,
  - à proximité d'appareils générateurs de champs magnétiques puissants,
  - dans les endroits soumis à des vibrations et,
  - dans les endroits mal aérés.
- Faire attention à la condensation due à l'humidité.
  Eviter d'utiliser le BP-5300TR immédiatement après avoir transporté celui-ci d'un endroit froid à un endroit chaud, ou bien immédiatement après avoir réchauffé une pièce qui était auparavant froide, car la vapeur d'eau contenue dans l'air chaud se condense sur les têtes vidéo, le tambour et les guides de bande qui sont encore froids. Cette humidité risque d'endommager la bande et l'appareil.
- Prendre soin du BP-5300TR.
  - Ne pas boucher les ouïes d'aération.
  - Ne pas poser d'objets lourds sur le lecteur de cassette vidéo.
  - Ne pas poser d'objets risquant de se renverser et d'endommager des pièces intérieures sur le lecteur de cassette vidéo.
  - Utiliser l'appareil uniquement en position horizontale (à plat).
- En cas de transport,
  - Eviter d'infliger à l'appareil des chocs violents en cours de transport ou d'emballage.
  - Avant l'emballage, ne pas oublier de retirer la cassette de l'appareil.

Cassettes vidéo

- Le BP-5300TR n'utilise que des cassettes de type VHS. Les bandes de type E PAL/SECAM et les bandes NTSC de type T peuvent être lues.
- Eviter d'exposer les cassettes aux rayons directs du soleil. Toujours les garder loin des appareils de chauffage.
- Eviter les endroits extrêment humides, les vibrations violentes ou chocs, les champs magnétiques puissants (près d'un moteur, d'un transformateur ou d'un aimant) et les places poussiéreuses.
- Placer les cassettes dans leurs boîtes et les mettre toujours verticalement.



ATTENTION
Pour certaines raisons, il est nécessaire de placer l'interrupteur d'alimentation (POWER) sur ON après l'avoir placé sur OFF. Il est recommandé de ne pas le faire immédiatement et de laisser s'écouler plus de deux secondes, sinon il se peut que la cassette soit éjectée ou que l'appareil ne puisse pas être utilisé avec l'indicateur POWER clignotant. Si cela se produit, placer l'interrupteur d'alimentation sur OFF, et laisser plus de deux secondes s'écouler avant de le remettre sur ON.

ATTENTION:
Suivant l'utilisation faite, il sera peut être nécessaire de vérifier périodiquement ce lecteur de cassette vidéo. En cas de nécessité, consulter un agent de service JVC.

CARACTERISTIQUES GENERALES

Lecture en trois systèmes
Pour plus de souplesse d'utilisation, le BP-5300TR peut lire les signaux PAL, SECAM et NTSC 4,43 MHz.

Entraînement direct
Le tambour des têtes est entraîné directement par un moteur CC sans balais asservi, alors que le cabestan et les bobines sont entraînés directement par des moteurs CC indépendants, assurant une instabilité réduite, des images stables et un fonctionnement plus sûr.

Chassis en aluminium moulé d'une grande robustesse
Un chassis en aluminium moulé très rigide et très résistant supporte tous les circuits du BP-5300TR.

Chargement frontal de la cassette automatique motorisé
Introduire tout simplement une cassette vidéo légèrement dans la fenêtre de la façade et le moteur de chargement placera automatiquement et silencieusement la cassette de sorte qu'elle sera correctement mise en place pour commencer la mise en route.

Système à 4 têtes
Le BP-5300TR utilise deux paires de têtes vidéo, une paire pour la lecture normale et une autre pour le ralenti, l'arrêt sur image et la recherche. Permettant non seulement de réaliser une lecture de haute qualité, ceci permet aussi d'obtenir un ralenti, un arrêt sur image et une lecture accélérée très stables.

Commande entièrement logique assistée d'un microprocesseur
Tout en permettant un fonctionnement par touche à effleurement et un changement direct de mode, il permet aussi la télécommande totale de tous les modes de fonctionnement.

Recherche avant/arrière à 10 fois la vitesse normale
Ce dispositif permet de faire défiler la bande à 10 fois la vitesse normale en avant comme en arrière pour situer rapidement et avec précision une portion désirée d'un enregistrement.

Lecture à vitesse variable de l'arrêt sur image à 5 fois la vitesse normale
Lorsque le BP-5300TR est commandé par un boîtier de télécommande approprié, la vitesse de lecture peut être modifiée continuellement de l'arrêt sur image à 5 fois la vitesse normale aussi bien en avant qu'en arrière.

Cabestan asservi et possibilité de synchronisation externe
Du fait qu'il comprend un cabestan asservi et qu'il permet d'utiliser des signaux externes de référence sur lesquels sa lecture peut être verrouillée, le BP-5300TR peut s'adapter très bien à n'importe quel système vidéo existant.

Système audio à deux canaux
Deux pistes audio permettent d'effectuer des présentations bilingues.

Modulomètres de lecture audio
Un modulomètre de niveau est fourni pour chacun des deux canaux audio. Ils indiquent le niveau audio pendant la lecture.

Indicateur d'alignement
L'indicateur de niveau audio du canal 2 peut être commuté en un indicateur d'alignement de sorte qu'il est possible d'effectuer des alignements d'une grande précision pour une lecture critique.

Reproduction sonore haute fidélité
Le circuit audio assure une excellente reproduction sonore. Il est aussi assisté d'un système de réduction du bruit Dolby* incorporé, pour vous permettre d'écouter une reproduction sonore haute fidélité agréable.

Fonctions de recherche et de répétition d'une grande efficacité
Ce lecteur de cassette vidéo comprend la recherche par compteur, la répétition totale, la répétition par compteur et le réembobinage automatique en fin de bande.

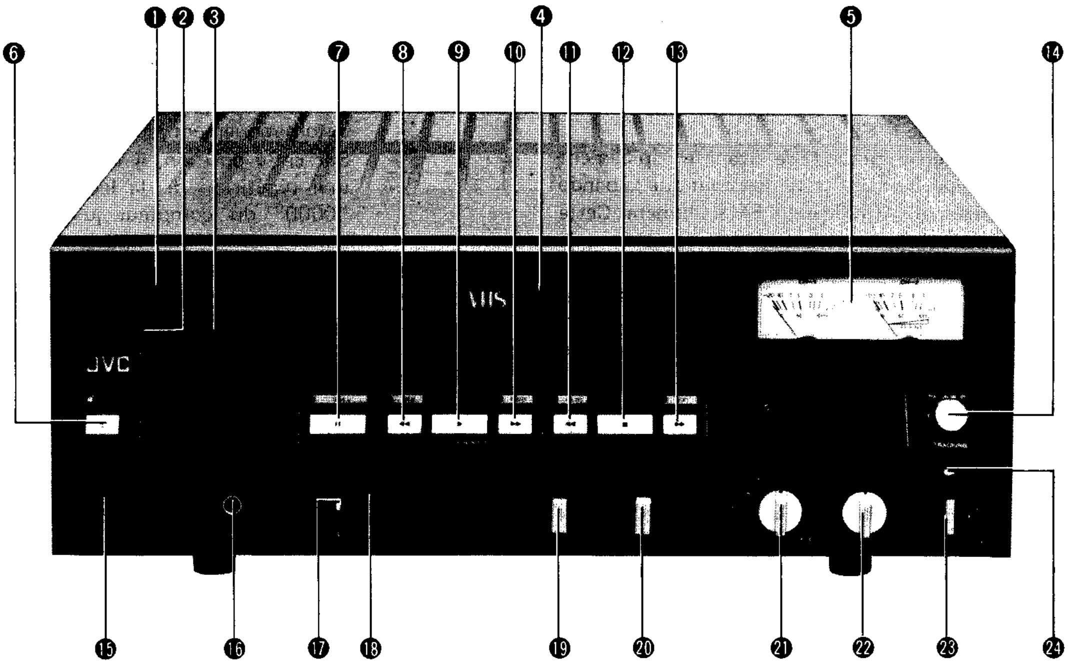
Compteur de bande électronique/indicateur de temps réel
Le compteur de bande à 4 chiffres incorporé peut être commuté en un compteur de temps réel à 5 chiffres.

Boîtiers de télécommande disponibles en option
Un choix de boîtiers de télécommande compacts sont disponibles en option: un boîtier de télécommande sans fil et un boîtier de télécommande raccordable.

Liaison de commande de montage
Pour effectuer des montages plus élaborés, une liaison directe avec des unités de commande de montage automatique JVC est possible, ce qui permet d'effectuer avec précision et rapidité les montages de bandes de 1/2 pouce à 3/4 pouce.

COMMANDES ET CONNECTEURS

Façade



❶ **Compteur de bande électronique/compteur de temps réel**
Cet affichage fluorescent fonctionne comme compteur de bande à 4 chiffres ou comme indicateur de temps réel suivant le réglage du sélecteur de mode d'affichage ❷. Lorsque la bande est bobinée en avant, l'affichage du compteur va dans le sens des chiffres croissants. Lorsque la bande est bobinée en arrière, l'affichage du compteur va dans le sens des chiffres décroissants et après zéro, le symbole "moins" apparaît.

❷ **Sélecteur de mode d'affichage (TAPE/LAP)**
L'affichage fluorescent fonctionne comme compteur de bande lorsque cette touche est sortie. Lorsque cette touche est enfoncée, l'affichage devient un compteur de temps réel. Pour revenir au compteur de bande, enfoncer une nouvelle fois la touche.
TAPE: Compte jusqu'à ±9999.
LAP: Compte jusqu'à ±9 heures, 59 minutes, 59 secondes.

❸ **Touche de remise à zéro (RESET)**
Enfoncer cette touche pour remettre le compteur de bande ou de temps réel à zéro.

❹ **Fenêtre de chargement de cassette**
Une fois que l'interrupteur d'alimentation est placé sur ON, introduire une cassette vidéo en plaçant le côté avec l'étiquette vers soi. Le porte-cassette se chargera du reste automatiquement et la cassette sera correctement chargée en place.

❺ **Indicateurs de niveau de lecture audio/Indicateur d'alignement**
Ces indicateurs indiquent le niveau audio durant la lecture. L'indicateur du canal 2 est commuté comme indicateur d'alignement lorsque le sélecteur de fonction indicateur/commande d'alignement (TRACKING) ⓮ est sorti.

❻ **Touche d'éjection (EJECT)**
Enfoncer cette touche pour éjecter la cassette. Cette touche peut être enfoncée dans le mode d'arrêt ou immédiatement après que la touche STOP ait été enfoncée. L'indicateur EJECT clignotera durant le déchargement automatique de la cassette et il restera allumé une fois que l'éjection sera terminée.

❼ **Touche d'arrêt sur image (STILL)**
Enfoncer cette touche pour arrêter temporairement la bande. Lorsque cette touche est enfoncée durant la lecture ou la recherche avant/arrière, une image fixe apparaît immédiatement avec l'indicateur STILL allumé. Le mode d'arrêt sur image est annulé en enfonçant la touche PLAY ❾.

❽ **Touche de recherche arrière (REV) – (Recherche accélérée)**
En enfonçant cette touche durant le mode de lecture ou d'arrêt sur image, cela permet de lire la bande à environ 10 fois la vitesse normale dans le sens arrière. Durant la recherche, l'indicateur REV s'allumera. Pour annuler ce mode de recherche, enfoncer la touche PLAY, FF, REW, STILL, STOP ou FWD suivant le mode à choisir ensuite.

❾ **Touche de lecture (PLAY)**
Lorsque cette touche est enfoncée, la bande est chargée autour du mécanisme de transport de bande et le mode de lecture est engagé. Durant le chargement, l'indicateur PLAY clignotera et, une fois le chargement terminé, il restera continuellement allumé durant la lecture.

❿ **Touche de recherche avant (FWD) – (Recherche accélérée)**
En enfonçant cette touche durant le mode de lecture ou d'arrêt sur image, cela permet de lire la bande à environ 10 fois la vitesse normale dans le sens avant. Durant la recherche, l'indicateur FWD s'allumera. Pour annuler ce mode de recherche, enfoncer la touche PLAY, FF, REW, STILL, STOP ou REV suivant le mode à choisir ensuite.

⓫ **Touche de rebobinage (REW)**
Enfoncer cette touche pour réembobiner la bande à l'intérieur de la cassette. Pendant que la bande est réembobinée, l'indicateur REW s'allumera. Cette touche peut être enfoncée durant n'importe quel mode sauf celui d'éjection. Pour annuler le mode de retour arrière, enfoncer la touche PLAY, STOP ou FF suivant le mode à choisir ensuite.

⑫ **Touche d'arrêt (STOP)**
Enfoncer cette touche pour décharger et arrêter la bande. Cette touche a la priorité sur toutes les autres touches. Durant le déchargement de la bande dans la cassette, l'indicateur STOP clignotera et, une fois le déchargement terminé, il restera allumé.

⑬ **Touche d'avance rapide (FF)**
Enfoncer cette touche pour faire avancer rapidement la bande à l'intérieur de la cassette. Pendant que la bande est avancée rapidement, l'indicateur FF s'allumera. Cette touche peut être enfoncée durant n'importe quel mode sauf celui d'éjection. Pour annuler le mode d'avance rapide, enfoncer la touche PLAY, STOP ou REW suivant le mode à choisir ensuite.

⑭ **Commande d'alignement/sélecteur de fonction de l'indicateur (TRACKING)**
Si des barres de parasites apparaissent sur l'écran, régler l'alignement en utilisant cette commande. Tirer tout d'abord la commande pour commuter l'indicateur de niveau audio du canal 2 en un indicateur d'alignement et tourner la commande jusqu'à ce que l'aiguille dévie au maximum vers la droite.

⑮ **Borne de télécommande à 7 broches (REMOTE) (DIN à 7 broches)**
Un boîtier de télécommande exclusif JVC peut être raccordé à cette borne. Un boîtier de télécommande sans fil JVC est aussi disponible. En utilisant le boîtier de télécommande sans fil, cette borne reçoit un récepteur qui est fourni avec le boîtier de télécommande.

⑯ **Prise de casque d'écoute (PHONES) (6 mmφ)**
Raccorder un casque stéréo possédant une impédance de 8 à 300 ohms à cette prise. Le canal audio choisi à l'aide du sélecteur AUDIO MONITOR ⑲ peut être entendu. Le niveau de sortie est commutable entre bas, normal et haut en utilisant le sélecteur PHONES LEVEL ㊱ du panneau arrière.

⑰ **Indicateur de réduction du bruit audio (NR INDICATOR)**
Cette diode s'allume lorsque le commutateur AUDIO NR ⑱ est placé sur ON.

⑱ **Commutateur de réduction du bruit audio (AUDIO NR)**
Placé sur ON, le système de réduction du bruit Dolby* est mis en circuit pour réduire le souffle de la bande.

⑲ **Sélecteur de sortie de contrôle sonore (AUDIO MONITOR)**
Ce sélecteur permet de choisir la sortie audio disponible à la prise TV ㉚ à 8 broches, la prise de casque d'écoute ⑯ ou à la prise AUDIO MONITOR ㉟ .

CH-1: Pour écouter le son du canal 1.
CH-2: Pour écouter le son du canal 2.
MIX: Pour écouter ensemble le canal 1 et le canal 2.

⑳ **Sélecteur de mode vidéo (VIDEO MODE)**

COLOUR: Le placer sur cette position quand le signal de lecture vidéo est en couleur.
AUTO: Le circuit est commuté automatiquement pour la couleur ou le noir et blanc par la détection du signal d'impulsion de couleur. Cette position suffit à la plupart des besoins.
B/W: Le placer sur cette position quand le signal de lecture vidéo est monochrome.

㉑ **Commutateur de mémoire de bande (MEMORY)**
La répétition automatique de la lecture de certaines portions déterminées de la bande ou la recherche automatique par la lecture "0" du compteur, etc, est possible à effectuer.

SEARCH: La bande s'arrête lorsque le compteur atteint "0000" durant le mode d'avance rapide ou de rebobinage.
OFF : Placer sur cette position lorsque ces fonctions de mémoire ne sont pas utilisées.
↻ : La bande sera automatiquement réembobinée en arrivant au bout (normalement) et elle sera lue plusieurs fois lorsqu'elle atteindra son début. La bande entière peut être reproduite automatiquement plusieurs fois de suite.
0000→↻ : Sur cette position, il est possible d'effectuer une répétition de la lecture de l'indication "0000" du compteur jusqu'au bout de la bande.
↻→0000 : Sur cette position, il est possible d'effectuer une répétition de la lecture du début de la bande jusqu'à l'indication "0000" du compteur.

Remarque:
Les marques inscrites sur les positions du commutateur indiquent un nombre à quatre chiffres (0000). Cependant, l'indication réelle pour zéro est à un seul chiffre (0).

㉒ **Sélecteur de système vidéo (VIDEO SYSTEM)**

SECAM: Le placer sur cette position si vous voulez lire des signaux SECAM.
PAL: Le placer sur cette position si vous voulez lire des signaux PAL.
MODIFIED NTSC: Le placer sur cette position si vous voulez lire des bandes NTSC. (Un moniteur TV avec un décodeur NTSC 4,43 MHz incorporé est nécessaire).

㉓ **Interrupteur d'alimentation (POWER)**

㉔ **Indicateur d'alimentation (POWER) (et d'avertissement)**
Cette diode s'allume lorsque l'alimentation est en circuit. Si le défilement de la bande est incorrect, cet indicateur se mettra à clignoter. Les causes peuvent être:

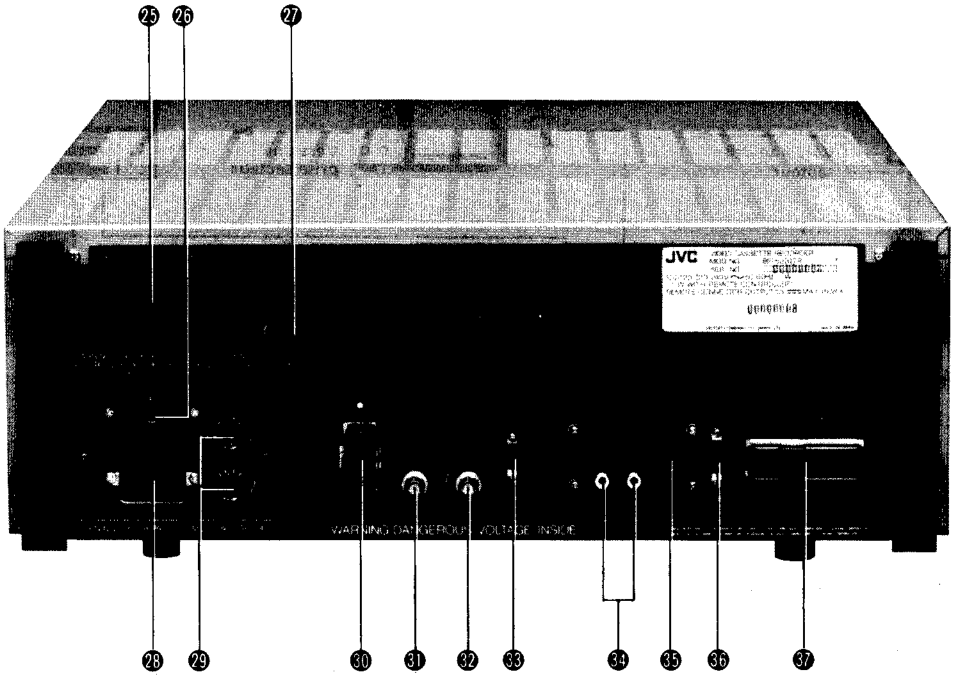
(1) Le senseur de condensation de l'humidité est en marche,
(2) La lampe du senseur de fin de bande a grillé,
(3) Le tambour des têtes ne tourne pas,
(4) Le mécanisme d'éjection ne fonctionne pas correctement,
(5) Le mécanisme de chargement et déchargement automatique ne fonctionne pas correctement, ou
(6) La bande s'arrête de défiler.

L'indicateur clignote deux fois environ par seconde dans le cas (1) et cinq fois environ dans les cinq autres cas.

---

*Dolby est une marque déposée de Dolby Laboratories Licensing Corporation.

Panneau arrière



㉕ **Compartiment du convertisseur HF**

㉖ **Sélecteur de tension**
Le régler sur la tension correspondant à celle de votre région. Voir page 12.

㉗ **Prise de sortie HF (RF OUT)**
Pour le raccordement d'un téléviseur via sa prise d'antenne

㉘ **Prise d'entrée CA (AC IN)**

㉙ **Porte-fusibles**

㉚ **Prise de moniteur TV (TV) (8 broches)**
C'est une prise de sortie à 8 broches destinée au raccordement d'un moniteur TV. Le signal audio choisi par le commutateur AUDIO MONITOR ⑲ est présent à la prise de sortie audio.

㉛ **Prise de sortie de ligne vidéo (VIDEO OUT) (Type BNC)**
C'est la prise de sortie de ligne pour le signal vidéo.

㉜ **Prise d'entrée de signal de synchronisation externe (SYNC IN) (Type BNC)**
C'est une prise d'entrée qui accepte un signal de synchronisation externe de référence lorsque le lecteur de cassette vidéo doit fonctionner dans le mode de synchronisation externe. Le signal de synchronisation externe peut être un signal de synchronisation composite ou un signal vidéo composite.

㉝ **Sélecteur de synchronisation de lecture (PB SYNC)**
Placer sur EXT lorsque la lecture doit être verrouillée sur un signal de synchronisation externe.

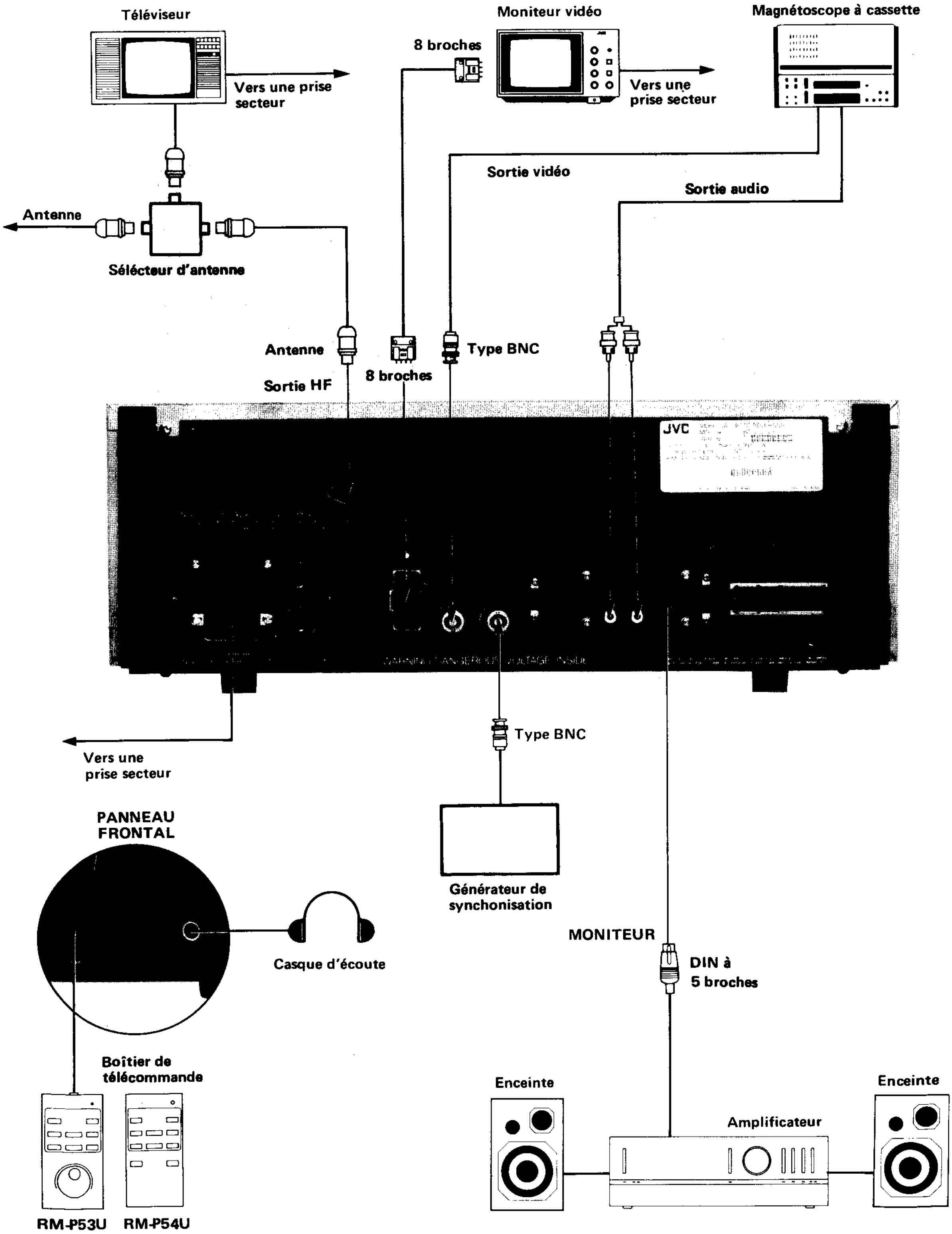
㉞ **Prises de sortie de ligne audio (AUDIO OUT CH-1, CH-2) (Type RCA)**
Ce sont les prises de sortie de ligne pour le signal audio du canal-1 et canal-2.

㉟ **Prise de sortie de contrôle audio (AUDIO MONITOR) (DIN à 5 broches)**
Le signal audio choisi par le sélecteur AUDIO MONITOR ⑲ est disponible à cette prise.

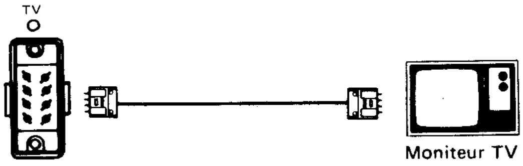
㊱ **Sélecteur de niveau de casque d'écoute (PHONES LEVEL)**
Le niveau de sortie de la prise du casque d'écoute ⑯ peut être sélectionné en trois étapes (HIGH, MED, LOW).

㊲ **Prise de télécommande (REMOTE) (45 broches)**
Raccorder un boîtier de télécommande à cette prise.

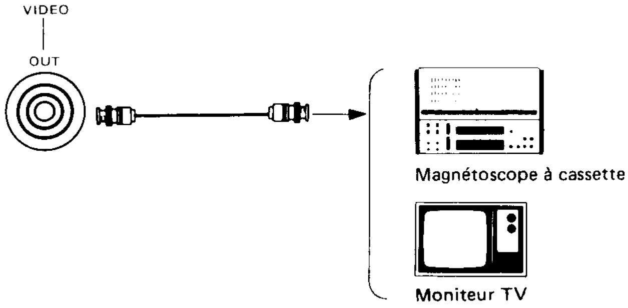
EXEMPLE DE RACCORDEMENT


Téléviseur
Vers une prise secteur
Moniteur vidéo
8 broches
Vers une prise secteur
Magnétoscope à cassette
Sortie vidéo
Sortie audio
Antenne
Séléctеur d'antenne
Antenne
Sortie HF
8 broches
Type BNC
JVC
Vers une prise secteur
Type BNC
Générateur de synchonisation
PANNEAU FRONTAL
Casque d'écoute
MONITEUR
DIN à 5 broches
Boîtier de télécommande
RM-P53U
RM-P54U
Enceinte
Amplificateur
Enceinte

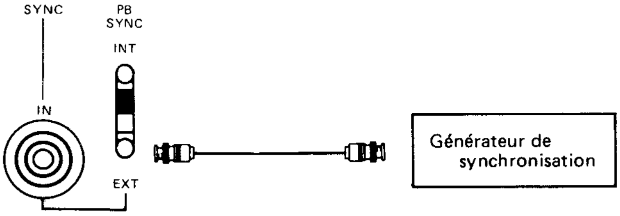
1. Borne TV (8 broches)


TV
Moniteur TV

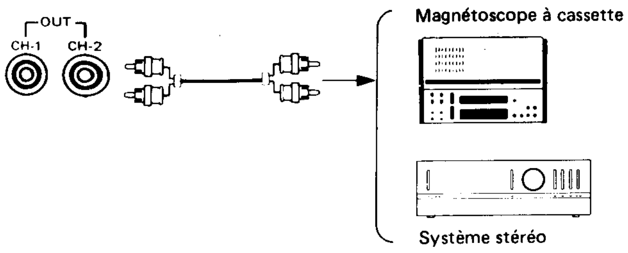
2. Borne de sortie vidéo (BNC)


VIDEO
OUT
Magnétoscope à cassette
Moniteur TV

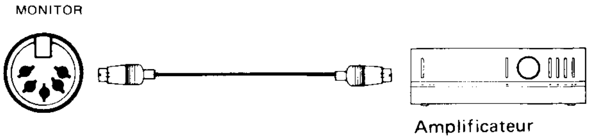
3. Borne d'entrée de synchronisation (BNC)


SYNC
PB SYNC
INT
IN
EXT
Générateur de synchronisation

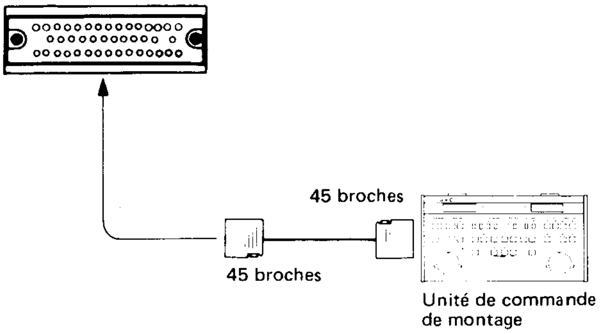
4. Borne de sortie audio (RCA)


Magnétoscope à cassette
OUT
CH-1
CH-2
Système stéréo

5. Borne de contrôle audio (DIN)


MONITOR
Amplificateur

6. Borne de télécommande (45 broches)


45 broches
45 broches
Unité de commande de montage

INSTALLATION DU CONVERTISSEUR HF

- S'il est nécessaire d'installer un convertisseur HF, enlever le couvercle du compartiment du convertisseur HF en desserrant les deux vis. Pour connaître le modèle de convertisseur HF approprié, consulter un revendeur JVC.

Nous vous recommandons d'utiliser le convertisseur HF qui convient, c'est à dire l'un des modèles de la liste ci-dessous:

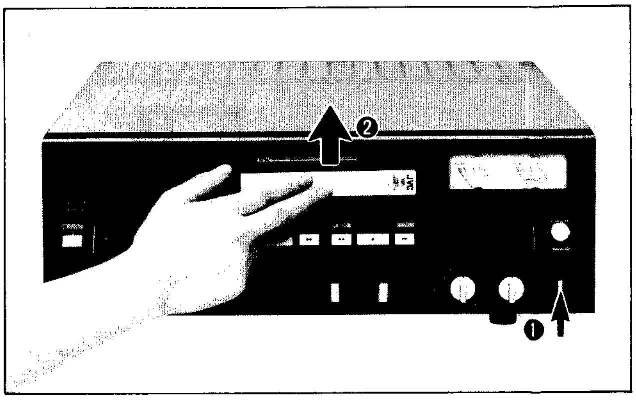
PU54120 pour le système PAL G
PU54121 pour le système PAL I
PU54122 pour le système SECAM L
PU54123 pour l'Australie

Remarque:
Lorsque vous utilisez ce lecteur video dans des pays soumis à des lois concernant les ondes électromagnétiques, il est interdit de se servir d'un convertisseur HF qui n'appartient pas à la liste ci-dessus.

CHARGEMENT ET DECHARGEMENT D'UNE CASSETTE VIDEO

Chargement

❶ Enfoncer l'interrupteur POWER sur ON. L'indicateur EJECT clignotera.

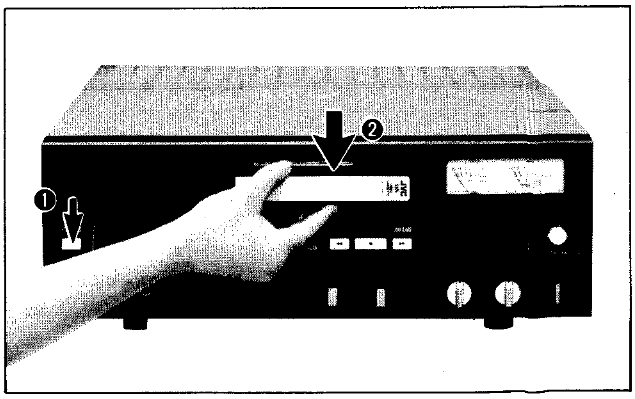


❷ Une fois que l'indicateur EJECT s'arrête de clignoter et reste allumé, introduire une cassette en plaçant le côté avec l'étiquette vers soi. La cassette sera automatiquement introduite et mise en place en position correcte.

- L'indicateur STOP clignotera durant le chargement automatique de la cassette et, lorsqu'elle sera correctement chargée, il restera allumé.
- Le mécanisme de chargement automatique fonctionnera seulement lorsque la cassette est correctement mise en place.
- Si le chargement ne s'effectue pas normalement, la cassette sera éjectée après environ 6 secondes.

Déchargement

❶ Enfoncer la touche EJECT durant le mode d'arrêt. La cassette sera éjectée automatiquement.



❷ Retirer la cassette de la fenêtre de chargement.

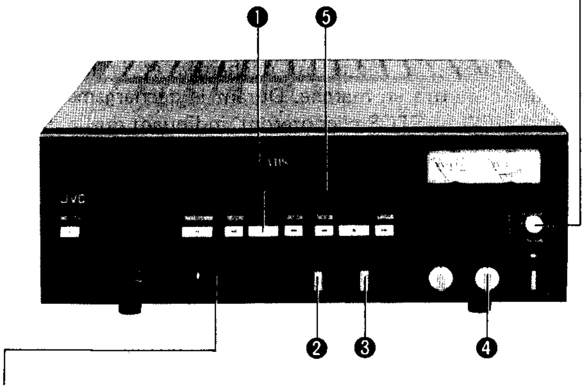
- L'indicateur EJECT clignotera durant le déchargement automatique de la cassette et il restera allumé jusqu'à la fin de l'éjection.
- La touche EJECT peut être enfoncée immédiatement après que la touche STOP ait été enfoncée. Le circuit logique mettra en mémoire la séquence; engager tout d'abord le lecteur de cassette vidéo dans le mode d'arrêt et il sera automatiquement changé en mode d'éjection.

LECTURE

Lecture normale

❶ Charger une cassette enregistrée.
❷ Placer le sélecteur AUDIO MONITOR comme il faut.

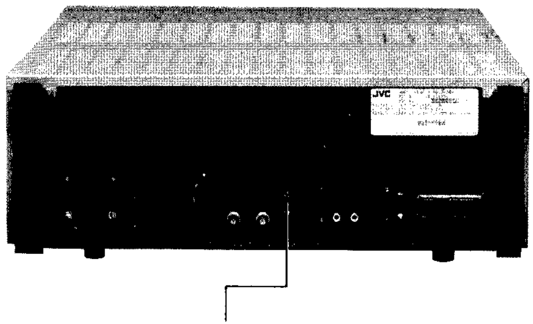
Si des barres parasites apparaissent sur l'écran, régler la commande TRACKING pour améliorer l'image.



Placer le commutateur AUDIO NR sur ON si vous lisez une bande dont le bruit a été réduit.

❸ Placer le sélecteur VIDEO MODE sur la position voulue.
❹ Placer le sélecteur VIDEO SYSTEM sur la position voulue.
❺ Enfoncer la touche PLAY pour mettre en route la lecture. La bande est tout d'abord chargée sur le mécanisme de transport de bande et la lecture commence ensuite. Durant le chargement de la bande, l'indicateur PLAY clignote et, une fois le chargement terminé, il reste allumé.

Lecture à verrouillage externe

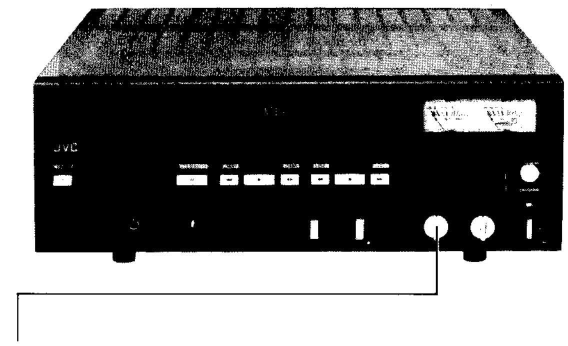


PB SYNC
Placer sur EXT lorsque la lecture doit être verrouillée sur un signal de synchronisation externe. (Utiliser un signal de synchronisation composite ou un signal vidéo composite comme signal de synchronisation de référence.)

Remarque:
- Lorsque la bande arrive au bout durant la lecture, elle sera automatiquement déchargée du mécanisme de transport de bande, puis elle sera réembobinée et s'arrêtera à son début.

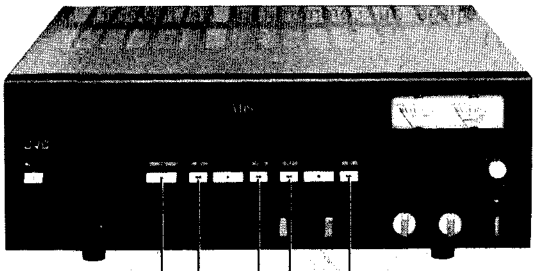
Lecture répétée

Trois fonctions différentes de répétition sont disponibles suivant le réglage du commutateur de mémoire de bande (MEMORY)



↻	Pour répéter la bande continuellement.
0000→↻	Pour répéter la section commençant à l'affichage zéro du compteur et se terminant en fin de bande.
↻→0000	Pour répéter la section commençant au début et se terminant à l'affichage zéro du compteur.

DISPOSITIFS PRATIQUES



AVANCE RAPIDE

Pour avancer rapidement la bande, enfoncer la touche FF. Lorsque la touche FF est enfoncée dans le mode de lecture ou d'arrêt sur image, la bande est déchargée et le mode d'avance rapide se met en marche. Durant le déchargement, les indicateurs FF et STOP clignoteront, indiquant que le mode d'avance rapide est maintenu en mémoire.

REBOBINAGE

Pour réembobiner la bande, enfoncer la touche REW. Lorsque la touche REW est enfoncée durant le mode de lecture ou d'arrêt sur image, la bande est déchargée et le mode de rebobinage se mettra en marche. Durant le déchargement, les indicateurs REW et STOP clignoteront, indiquant que le mode de retour arrière est maintenu en mémoire.

ARRET SUR IMAGE

Une fois le mode de lecture engagé en enfonçant la touche PLAY, enfoncer la touche STILL. L'indicateur STILL s'allumera et l'image se "gèlera" instantanément.
Pour libérer le mode d'arrêt sur image, enfoncer la touche PLAY.

Remarque:
En laissant la touche STILL enfoncée durant la lecture, une image normale ne pourra plus être obtenue après 2 ou 3 minutes. Ceci est dû à la tension de la bande qui est automatiquement réduite pour protéger la bande, et non à un défaut de l'appareil.

RECHERCHE AVANT/ARRIERE

La fonction de recherche avant/arrière permet d'atteindre rapidement une portion désirée d'un enregistrement tout en visionnant les images de lecture sur l'écran du moniteur. La vitesse de défilement de la bande est d'environ 10 fois la vitesse normale et "la recherche d'une scène" est possible en avant comme en arrière.

- Une fois le mode de lecture engagé, enfoncer soit la touche REV ou FWD suivant le sens où la recherche doit s'effectuer. Lorsque les images de la scène désirée apparaîtront, enfoncer la touche PLAY ou STILL, suivant le mode désiré.

EN CAS DE DIFFICULTE

Souvent, ce qui paraît être une panne n'est en réalité qu'un petit problème. Il faut s'en assurer d'abord . . .

Symptômes	Points à vérifier
Image neigeuse.	● En utilisant un téléviseur pour la lecture, vérifier si le sélecteur de canaux du téléviseur est bien placé sur le canal du convertisseur HF. ● Tourner doucement la commande TRACKING jusqu'à ce que l'image devienne nette.
La bande s'arrête soudainement.	● Vérifier le réglage du commutateur MEMORY.
L'indicateur de niveau audio du canal 2 ne bouge pas.	● Vérifier le réglage du sélecteur de fonction de l'indicateur pour voir s'il est dans la position d'indicateur d'alignement.

Remarque: Si l'indicateur POWER clignote, consulter un revendeur JVC.

CARACTERISTIQUES TECHNIQUES

GENERAL
Format : VHS 1/2" (12,65 mm)
Alimentation : 100/120/220/240 V∿, 50/60 Hz
Consommation : 76 watts (avec l'unité de contrôle de montage automatique, 12 V ⎓ , 0,55 A)
Dimensions : 44,0(L) x 16,4(H) x 44,8(P) mm
Poids : 17,5 kg
Température de fonctionnement : De 5°C à 40°C
Température de stockage : De -20°C à 60°C
Position de fonctionnement : Horizontale seulement
Vitesse de bande : 23,39 mm/sec (PAL/SECAM)
33,35 mm/sec (NTSC)
Vitesse de la recherche : Recherche avant/arrière ±10X
Variable 0 ~ ±5X, ±10X

VIDEO
Système de lecture : Système à deux têtes rotatives, balayage hélicoïdal
Système de signal vidéo : PAL/SECAM/NTSC 4,43
Sortie ligne/TV : 1,0 Vc-c, 75 ohms, asymétrique
Rapport signal/bruit : Monochrome: 43 dB (mesureur de bruit Rohde & Schwarz)
Résolution horizontale : Monochrome: 250 lignes (PAL), 240 lignes (SECAM),
Entrées sync : 0.5 à 4 Vc-c, 75 ohms, asymétrique
Sélection sync : INT/EXT

AUDIO
Sortie Ligne : -6 dBs, à 10 kohms, asymétrique
Moniteur : 0 dBs, à 10 kohms, asymétrique (CH-1/MIX/CH-2)
Casque : HIGH/MED/LOW, 8 à 300 ohms, asymétrique
TV : 0 dBs, basse impédance, asymétrique
Rapport signal/bruit : Plus de 47 dB (avec le réducteur de bruit) 42 dB (sans le réducteur de bruit) (à 3 % de distorsion)
Réponse en fréquence : 40 à 12.000 Hz
Sélection de sortie de contrôle : CH-1/MIX/CH-2

CONNECTEURS
Sortie vidéo : Borne de type BNC
Entrée Sync : Borne de type BNC
Sortie HF : Antenne
Sortie TV : Borne TV à 8 broches EIAJ
Audio Sortie ligne : Prises de type RCA
Sortie de contrôle : DIN à 5 broches
Casque : Prise de 6 mm
Télécommande : Borne à 45 broches
Entrée CA : Borne CA à 3 conducteurs
Accessoire : 1 ensemble

Présentation et caractéristiques modifiables sans préavis.

BP-5300TR
FARB-VIDEO-CASSETTEN-PLAYER

ACHTUNG:

SCHÜTZEN SIE DIESES GERÄT VOR REGEN UND FEUCHTIGKEIT, DAMIT ES NICHT IN BRAND GERÄT ODER EIN KURZSCHLUSS ENTSTEHT.

WARNUNG

Gefährliche Spannung im Innern. Lassen Sie die Wartung der Innenteile von qualifizierten Kundendienst-Technikern durchführen. Zur Vermeidung von elektrischen Schlägen oder Feuergefahr sollten Sie das Netzkabel von der Netzsteckdose abtrennen, jeweils bevor Sie irgendeine Signalleitung oder Antenne anschließen oder abtrennen, vor Auswechselung der Sicherung und Änderung der Spannungseinstellung.

SPANNUNGSVERSORGUNG

Anschluß an das Netz

Die Betriebsspannung dieses Gerätes ist werkseitig auf 240 V∿ eingestellt.

Überprüfen Sie, ob der Spannungswähler auf der Geräterückseite auf Ihre Netzspannung eingestellt ist, bevor Sie das Gerät an das Netz anschließen.

Einstellung auf örtliche Netzspannung

Dieses Gerät kann mit 100, 120, 220 oder 240 V∿ betrieben werden. Wenn die voreingestellte Spannung nicht mit Ihrer örtlichen übereinstimmt, stellen Sie den Spannungswähler neu ein. Führen Sie einen Schraubenzieher in den Schlitz des Spannungswählers ein und drehen Sie ihn, bis die korrekte Spannung angezeigt ist.

HINWEIS: Das Leistungsschild (mit der Seriennummer) befindet sich an der Rückplatte des Geräts.

INHALT

Vorsichtsmaßnahmen 23
Merkmale 24
Bedienelemente und Anschlüsse 25
Beispiel für Anschlüsse 28
Installation des HF-Modulators 30
Einlegen und Entnehmen einer Videocassette 30
Wiedergabe 31
  Normale Wiedergabe 31
  Wiedergabesynchronisierung 31
  Abspielwiederholung 31
Weitere Funktionen 32
Störungssuche 32
Technische Daten 33

VHS

Nur Cassetten mit der Kennzeichnung "VHS" können mit diesem Video-Cassetten-Player verwendet werden.

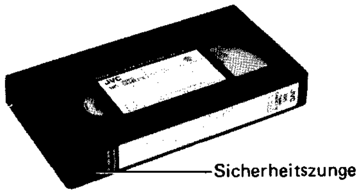
VORSICHTSMASSNAHMEN

Behandlung und Lagerung

- Vermeiden Sie eine Verwendung des BP-5300TR unter den folgenden Bedingungen:
  - an extrem heißen, kalten oder feuchten Orten,
  - an staubigen Orten,
  - in der Nähe von Geräten, die starke magnetische Felder erzeugen,
  - an Orten, die Vibrationen ausgesetzt sind und
  - an schlecht belüfteten Orten.
- Achten Sie auf Feuchtigkeits-Kondensation.
  Vermeiden Sie eine Verwendung des BP-5300TR, nachdem Sie ihn von einem kalten zu einem warmen Ort gebracht haben oder nachdem Sie den kalten Raum geheizt haben. Wasserdampf in der warmen Luft schlägt sich auf der noch kalten Video-Kopftrommel und auf den Bandführungen nieder, und diese Feuchtigkeit kann zu Beschädigungen des Bandes und des Players führen.
- Gehen Sie sorgfältig mit dem BP-5300TR um.
  - Verschließen Sie nicht die Belüftungsöffnungen.
  - Legen Sie keine schweren Gegenstände auf den Player.
  - Stellen Sie keine Gefäße mit Flüssigkeit auf den Recorder, weil der Player beschädigt werden kann, wenn Flüssigkeit in das Innere eindringt.
  - Den Player nur in horizontaler (flacher) Aufstellung benutzen.
- Beim Transport:
  - Vermeiden Sie beim Verpacken und beim Transport starke Erschütterungen.
  - Entnehmen Sie die Cassette vor dem Verpacken.

Video-Cassetten

- Der BP-5300TR arbeitet nur mit Cassetten nach dem VHS-System.
  E-Typ-Cassetten für PAL/SECAM sowie T-Typ-NTSC-Cassetten können wiedergegeben werden.
- Setzen Sie die Cassetten nicht direktem Sonnenlicht aus. Halten Sie sie von Heizquellen entfernt.
- Vermeiden Sie extreme Feuchtigkeit, starke Vibrationen und Erschütterungen, starke magnetische Felder (wie in der Nähe von Motoren, Transformatoren und Magneten) und staubige Orte.
- Bewahren Sie die Cassetten in ihren Behältern auf und stellen Sie sie senkrecht auf.



ZUR BEACHTUNG

Der Netzschalter (POWER) sollte nicht sofort nach dem Ausschalten (OFF) wieder eingeschaltet (ON) werden. Warten Sie nach dem Ausschalten länger als 2 Sekunden, weil es sonst vorkommen kann, daß die Cassette ausgeworfen wird oder der Player sich nicht mehr bedienen läßt, wobei die Netzanzeige (POWER) blinkt. Wenn dies passiert, schalten Sie den Netzschalter wieder auf OFF und warten Sie länger als 2 Sekunden, bevor Sie den Netzschalter erneut auf ON schalten.

ZUR BEACHTUNG

Abhängig von der Benutzungshäufigkeit sollte dieser Video-Cassetten-Player periodisch überprüft werden. Wenden Sie sich für Wartung an Ihren JVC-Fachhändler.

MERKMALE

Dreifachsystem-Wiedergabe
Der BP-5300TR kann PAL-, SECAM- und 4,43 MHz NTSC-Signale wiedergeben.

Direktantrieb-System
Die Kopftrommel wird durch einen servogesteuerten bürstenlosen Gleichstrom-Motor und der Capstan und die Spulen werden durch unabhängige Gleichstrom-Motoren direkt angetrieben. Dadurch werden minimale Bildstandsschwankungen, stabile Bilder und ein zuverlässiger Betrieb gewährleistet.

Aluminium-Druckguß-Chassis für hohe Beanspruchung
Das robuste und dauerhafte Aluminium-Druckguß-Chassis Ist für eine lange Benutzung des BP-5300TR unter hohen Belastungen ausgelegt.

Vollautomatischer Cassetten-Frontlademechanismus
Die Cassette wird nur leicht in die Öffnung an der Frontplatte eingeschoben, der Lademotor übernimmt sie dann und bringt sie automatisch und geräuschlos in die korrekte Betriebsposition.

4-Kopf-System
Der BP-5300TR ist mit zwei Paar Videoköpfen ausgerüstet, ein Paar für normale Wiedergabe, das andere für Zeitlupe, Standbild und Suchlauf-Wiedergabe. Dieses System gewährleistet Wiedergabe höchster Qualität und stabile Standbild-, Zeitlupen- und Zeitraffer-Wiedergabe.

Vollogische Mikroprozessor-Steuerung
Die vollogische Mikroprozessor-Steuerung gestattet Bedienung über Leichtdrucktasten mit direktem Betriebsartenwechsel und Fernbedienung aller Bandlauf-Funktionen.

Bildsuchlauf mit zehnfacher Normalgeschwindigkeit
Mit dem Bildsuchlauf in beiden Richtungen mit dem Zehnfachen der normalen Geschwindigkeit lassen sich gesuchte Bandstellen schnell und genau finden.

Wiedergabegeschwindigkeit von Standbild bis fünffacher Normalgeschwindigkeit einstellbar
Wenn der BP-5300TR mit einer geeigneten Fernbedienung bedient wird, kann die Wiedergabegeschwindigkeit stufenlos von Standbild bis zu fünffacher Normalgeschwindigkeit in beiden Richtungen geregelt werden.

Capstan-Servo und externe Synchronisierung
Der BP-5300TR kann leicht in jedes bestehende Videosystem integriert werden, weil der Capstan servogesteuert ist und externe Sync-Signale zur Synchronisierung der Wiedergabe eingegeben werden können.

Zweikanal-Audiosystem
Die beiden Audiospuren ermöglichen zweisprachige Wiedergabe.

Audio-Wiedergabe-Aussteuerungsanzeigen
Zur Überwachung der Audiopegel während der Wiedergabe, wurde für jeden der beiden Audiokanäle eine Aussteuerungsanzeige vorgesehen.

Tracking-Meßinstrument
Das Meßinstrument für Kanal 2 kann auf die Funktion als Tracking-Meßinstrument umgeschaltet werden, so daß für kritische Wiedergaben genaue Spurlagenausrichtung möglich ist.

Wiedergabe in Hifi-Qualität
Die fortschrittliche Audioschaltung gewährleistet exzellente Klangreproduktion, die noch durch das eingebaute Dolby*-Rauschunterdrückungssystem verbessert wird. Dies gestattet ein Hörvergnügen mit höchster Wiedergabetreue.

Flexible Suchlauf- und Wiederholungs-Funktionen
Die Ausstattung umfaßt Zählwerk-Suchlauf, Wiederholung des gesamten Bandes, Zählwerk-Wiederholung und automatisches Rückspulen am Bandende.

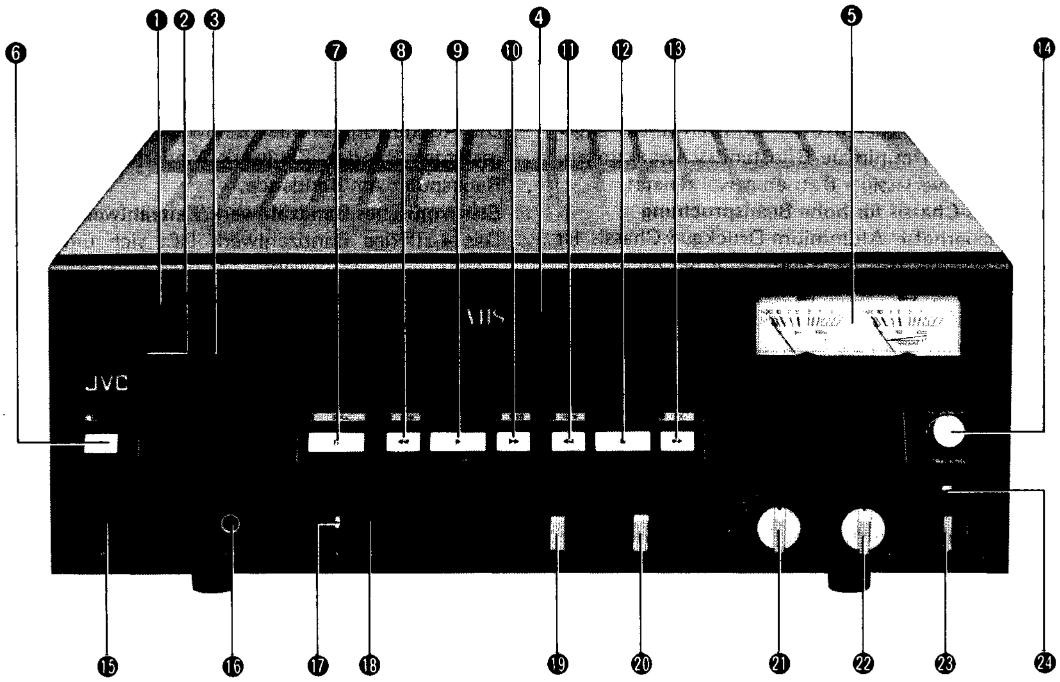
Elektronisches Bandzählwerk/Zeitzählwerk
Das 4-ziffrige Bandzählwerk läßt sich umschalten zu einem 5-ziffrigen Zeitzählwerk.

Fernbedienung als Sonderzubehör
Eine Auswahl an Fernbedienungen steht zur Verfügung: eine Infrarot-Fernbedienung und eine Kabel-Fernbedienung.

Schnittsteuerung-Anschluß
Durch den direkten Anschluß von JVCs Automatischer Schnittsteuerungseinheit können Schnitte von 1/2"-Bändern auf 3/4"-Bändern schnell und genau durchgeführt werden.

BEDIENELEMENTE UND ANSCHLÜSSE

Frontplatte



❶ **Elektronisches Bandzählwerk/Zeitzählwerk**
Abhängig von der Stellung des Anzeigeart-Schalters ❷ arbeitet dieses Fluoreszenz-Display als 4-ziffriges Bandzählwerk oder als 5-ziffriges Zeitzählwerk. Wenn das Band in Vorwärtsrichtung läuft, zählt das Zählwerk aufwärts. Wenn das Band in Rückwärtsrichtung läuft, zählt das Zählwerk abwärts, nach Null wird der Anzeige ein Minuszeichen vorangestellt.

❷ **Anzeigeart-Schalter (TAPE/LAP)**
Wenn dieser Schalter nicht gedrückt ist, arbeitet das Fluoreszenz-Display als Bandzählwerk. Wenn der Schalter gedrückt wird, arbeitet es als Zeitzählwerk.
Durch nochmaliges Drücken des Schalters wird wieder auf die Funktion als Bandzählwerk zurückgeschaltet.
TAPE: Zählt bis ±9999.
LAP: Zählt bis ±9 Stunden, 59 Minuten, 59 Sekunden.

❸ **Zählwerk-Rückstelltaste (RESET)**
Durch Drücken wird das Bandzählwerk oder das Zeitzählwerk auf Null zurückgestellt.

❹ **Cassetten-Einschub**
Während der Netzschalter (POWER) auf ON steht, eine Videocassette mit der beschrifteten Seite auf Sie zeigend einschieben. Der Cassettenträger übernimmt die Cassette automatisch und bringt sie in die korrekte Position.

❺ **Audio-Aussteuerungsanzeigen/Tracking-Meßinstrument**
Diese Meßinstrumente zeigen während Wiedergabe den Audiopegel an. Das CH-2-Meßinstrument arbeitet als Begrenzer-Meßinstrument, wenn der TRACKING-Regler/Meßinstrument-Wahlschalter ⓮ gezogen wird.

❻ **Auswurftaste (EJECT)**
Zum Auswerfen der Cassette drücken. Diese Taste kann bei Bandstopp oder unmittelbar nach dem Drücken der STOP-Taste gedrückt werden. Die EJECT-Anzeige blinkt beim automatischen Entladen der Cassette und leuchtet nach dem Entnehmen der Cassette.

❼ **Pause/Standbild-Taste (STILL)**
Für kurzzeitigen Bandstopp drücken. Wenn diese Taste während der Wiedergabe oder des Bildsuchlaufs gedrückt wird, erscheint sofort das Standbild, wobei die STILL-Anzeige leuchtet. Durch Drücken der PLAY-Taste ❾ wird die Standbild-Betriebsart aufgehoben.

❽ **Rückwärts-Bildsuchlauf-Taste (REV)**
Durch Drücken dieser Taste während Wiedergabe oder Standbild startet die Hochgeschwindigkeits-Wiedergabe mit zehnfacher Normalgeschwindigkeit in Rückwärtsrichtung. Während des Bildsuchlaufs leuchtet die REV-Anzeige. Zum Freigeben des Bildsuchlaufs die PLAY-, FF-, REW-, STILL-, STOP- oder FWD-Taste drücken, je nach der gewünschten nächsten Betriebsart.

❾ **Wiedergabetaste (PLAY)**
Wenn diese Taste gedrückt wird, wird das Band in den Bandtransportmechanismus geladen, danach startet die Wiedergabe. Während des Ladens blinkt die PLAY-Anzeige und leuchtet während der Wiedergabe.

❿ **Vorwärts-Bildsuchlauf-Taste (FWD)**
Durch Drücken dieser Taste während Wiedergabe oder Standbild startet die Hochgeschwindigkeits-Wiedergabe mit zehnfacher Normalgeschwindigkeit in Vorwärtsrichtung. Während des Bildsuchlaufs leuchtet die FWD-Anzeige. Zum Freigeben des Bildsuchlaufs die PLAY-, FF-, REW-, STILL-, STOP- oder REV-Taste drücken, je nach der gewünschten nächsten Betriebsart.

⓫ **Rückspultaste (REW)**
Zum Rückspulen des Bandes in der Cassette drücken. Beim Rückspulen leuchtet die REW-Anzeige. Diese Taste kann in jeder Betriebsart außer Auswerfen der Cassette gedrückt werden. Zum Freigeben des Rückspulens die PLAY-, STOP- oder FF-Taste drücken, je nach der gewünschten nächsten Betriebsart.

⑫ **Stopptaste (STOP)**
Zum Zurückziehen in die Cassette und Stoppen des Bandes drücken. Diese Taste hat Vorrang vor allen anderen Tasten. Während des Zurückziehens des Bandes in die Cassette blinkt die STOP-Anzeige und leuchtet danach.

⑬ **Schnellvorlauftaste (FF)**
Zum Vorspulen des Bandes in der Cassette drücken. Beim Vorspulen leuchtet die FF-Anzeige. Diese Taste kann in jeder Betriebsart außer Auswerfen der Cassette gedrückt werden. Zum Freigeben des Vorspulens die PLAY-, STOP- oder REW-Taste drücken, je nach der gewünschten nächsten Betriebsart.

⑭ **Tracking-Regler/Meßinstrument-Wahlschalter (TRACKING)**
Wenn Störzeilen auf dem Bildschirm erscheinen, das Tracking mit diesem Regler einstellen. Zuerst den Regler ziehen, um das CH-2-Aussteuerungs-Instrument auf die Funktion als Tracking-Meßinstrument umzuschalten, und dann den Regler so drehen, daß die Nadel maximal nach rechts ausschlägt.

⑮ **7 pol. DIN-Fernbedienungs-Anschluß (REMOTE)**
An diesen Anschluß kann eine JVC-Fernbedienung angeschlossen werden. Eine drahtlose Fernbedienung von JVC steht auch zur Verfügung. Wenn die drahtlose Fernbedienung benutzt wird, wird an den Anschluß ein Empfänger angeschlossen, der mit der Fernbedienung mitgeliefert wird.

⑯ **Kopfhörerbuchse (PHONES) (6 mmϕ)**
Zum Anschluß eines Stereo-Kopfhörers mit einer Impedanz von 8 – 300 Ohm. Der Kanal, der gehört werden soll, wird mit dem Audioausgang-Schalter (AUDIO MONITOR) ⑲ gewählt. Der Ausgangspegel kann mit dem Kopfhörerlautstärke-Schalter (PHONES LEVEL) ㉟ an der Rückplatte zwischen niedrig, normal und hoch geschaltet werden.

⑰ **Rauschunterdrückungs-Anzeige (NR INDICATOR)**
Diese LED leuchtet, wenn der Rauschunterdrückungs-Schalter (AUDIO NR) ⑱ auf ON steht.

⑱ **Rauschunterdrückungs-Schalter (AUDIO NR)**
Zum Aktivieren der eingebauten Dolby*-Rauschunterdrückung, die das Bandrauschen reduziert, auf ON stellen.

⑲ **Audioausgang-Schalter (AUDIO MONITOR)**
Dieser Schalter wählt den Audioausgang für den 8 pol. TV-Anschluß ㉚ , die Kopfhörerbuchse ⑯ und den Audioausgang (AUDIO MONITOR) ㉟ .
CH-1: Zum Hören von Kanal 1.
CH-2: Zum Hören von Kanal 2.
MIX: Zum Hören von Kanal 1 und Kanal 2 zusammen.

⑳ **Videobetriebsart-Schalter (VIDEO MODE)**
COLOUR: Auf diese Position stellen, wenn das Wiedergabe-Videosignal in Farbe ist.
AUTO: Die Schaltung für Farbe und Schwarz/Weiß wird durch Erfassen des Farb-Synchronsignals automatisch gewählt. Diese Position ist für die meisten Zwecke ausreichend.
B/W: Auf diese Position stellen, wenn das Wiedergabe-Videosignal ein Monochrom-Signal ist.

㉑ **Speicher-Schalter (MEMORY)**
Automatische Wiedergabe-Wiederholung von bestimmten Bandabschnitten, automatisches Suchen der Zählwerkanzeige "0" usw. ist möglich.

SEARCH : Beim Schnellvorlauf (FF) oder Rückspulen (REW) stoppt das Band an der Zählwerk-Position "0000".
OFF : Auf diese Position stellen, wenn keine der Speicher-Funktionen benutzt wird.
⟲ : Das Band wird (wie gewöhnlich) am Bandende automatisch zurückgespult und dann wiederholt wiedergegeben, wenn es den Anfang erreicht. Das gesamte Band kann wieder und wieder automatisch wiedergegeben werden.
0000 ⟲ : In dieser Position ist wiederholte Wiedergabe von der Zählwerk-Position "0000" bis zum Bandende möglich.
⟲ 0000 : In dieser Position ist wiederholte Wiedergabe vom Bandanfang bis zur Zählwerk-Position "0000" möglich.

Hinweis:
Die Markierungen für die Schalterpositionen geben eine 4-ziffrige Zahl an (0000). Die tatsächliche Zählwerkanzeige für Null ist jedoch eine einziffrige Zahl (0).

㉒ **Videosystem-Wahlschalter (VIDEO SYSTEM)**
SECAM: Zur Wiedergabe von SECAM-Signalen auf diese Position stellen.
PAL : Zur Wiedergabe von PAL-Signalen auf diese Position stellen.
MODIFIED NTSC: Zur Wiedergabe von NTSC-Bändern auf diese Position stellen. (Ein Fernseh-Monitor mit eingebautem 4,43 MHz NTSC-Dekoder ist erforderlich.)

㉓ **Netzschalter (POWER)**

㉔ **Netzanzeige (POWER) (und Warnanzeige)**
Diese LED leuchtet, wenn die Spannungsversorgung eingeschaltet ist. Wenn beim Bandlauf Fehlfunktionen auftreten, blinkt die Anzeige.

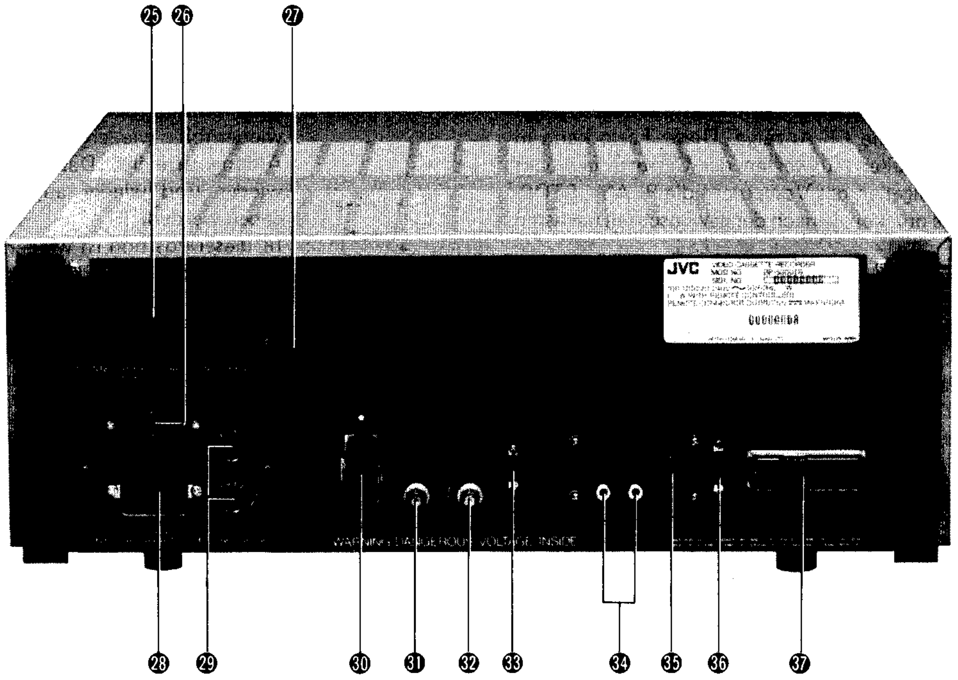
Die Ursachen können sein:
(1) der Kondensations-Sensor ist in Betrieb,
(2) die Bandende-Sensorlampe ist defekt,
(3) die Kopftrommel dreht sich nicht,
(4) der Auswurf-Mechanismus arbeitet nicht richtig,
(5) der automatische Band-Lade- und -Entlade-Mechanismus arbeitet nicht richtig oder
(6) das Band läuft nicht.

Die Anzeige blinkt im Fall (1) etwa zweimal pro Sekunde und in den anderen Fällen etwa einmal pro Sekunde.

---

*Dolby ist ein Warenzeichen der Dolby Laboratories Licensing Corporation.

Rückplatte



㉕ **HF-Modulator-Teil**

㉖ **Spannungswähler**
Auf die Netzspannung in Ihrem Gebiet einstellen. Siehe Seite 29.

㉗ **HF-Ausgang (RF OUT)**
Zum Anschluß eines Fernsehempfängers über die Antennenbuchse des Fernsehempfängers.

㉘ **Netzkabel-Anschluß (AC IN)**

㉙ **Sicherungshalter**

㉚ **Fernseh-Monitor-Anschluß (TV) (8 pol.)**
Dies ist ein 8 pol. Ausgangs-Anschluß zum Anschließen eines Fernseh-Monitors. Das Audiosignal, das mit dem AUDIO MONITOR-Schalter ⑲ gewählt wurde, liegt am Audio-Ausgang an.

㉛ **Video-Direktausgang (VIDEO OUT) (BNC-Buchse)**
Direktausgang für das Videosignal.

㉜ **Eingang für externes Sync-Signal (SYNC) (BNC-Buchse)**
Zur Eingabe eines externen Sync-Signals, wenn der Player mit einem externen Sync-Signal synchronisiert werden soll. Das externe Sync-Signal kann ein Sync-Signal oder ein BAS-Signal sein.

㉝ **Wiedergabe-Synchronisation-Wahlschalter (PB SYNC)**
Auf EXT stellen, wenn die Wiedergabe mit einem externen Sync-Signal synchronisiert werden soll.

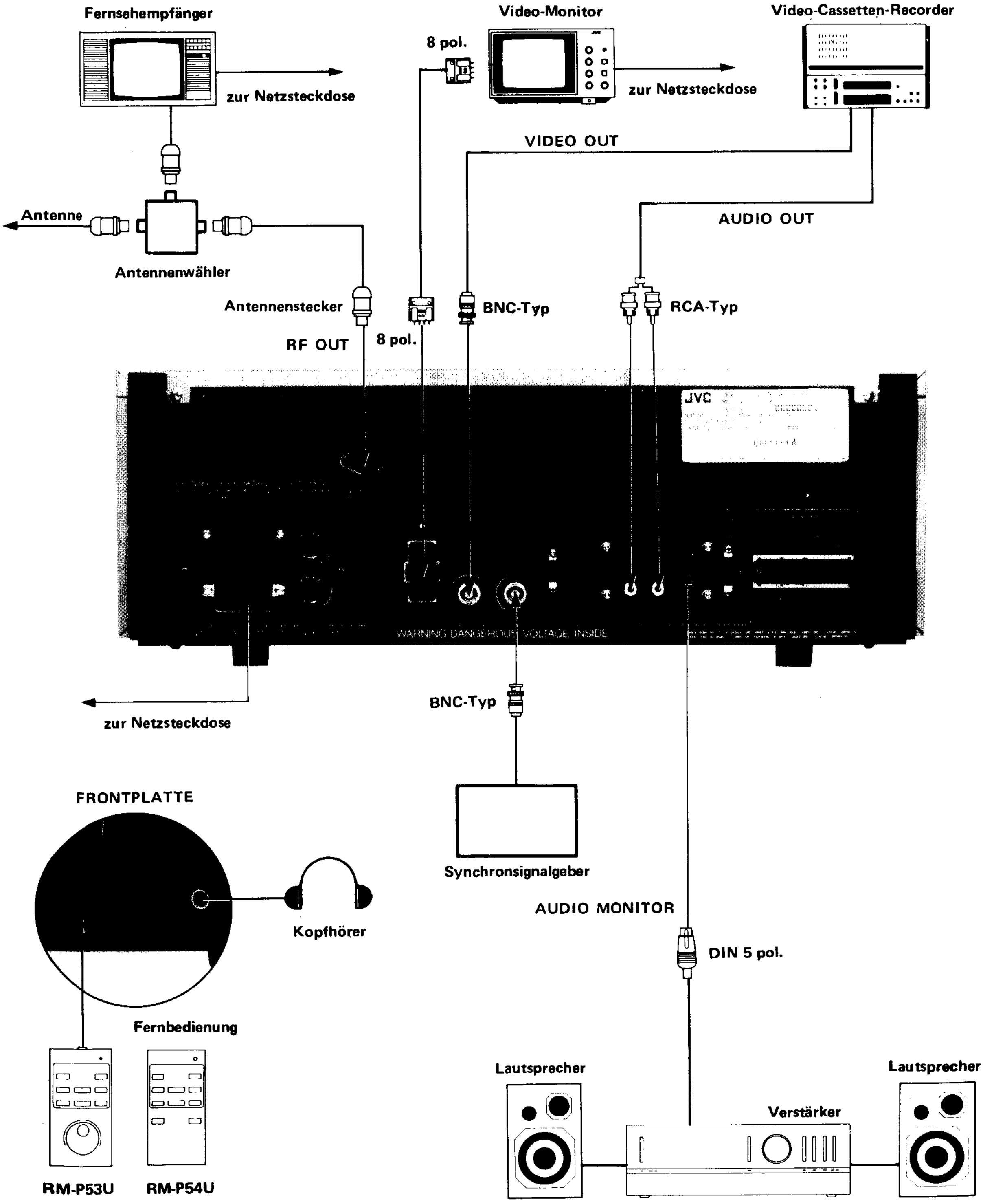
㉞ **Audio-Direktausgänge (AUDIO OUT CH-1, CH-2) (RCA-Buchsen)**
Direktausgänge der Audiosignale von Kanal 1 und Kanal 2.

㉟ **Audio-Überwachungs-Ausgang (AUDIO MONITOR) (DIN-Buchse, 5 pol.)**
Das mit dem AUDIO MONITOR-Schalter ⑲ gewählte Audiosignal ist erhältlich.

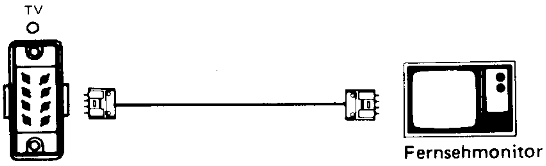
㊱ **Kopfhörerlautstärke-Schalter (PHONES LEVEL)**
Der Ausgangspegel der Kopfhörerbuchse ⑯ kann in drei Stufen (hoch (HIGH), mittel (MED), niedrig (LOW)) gewählt werden.

㊲ **Fernbedienungs-Anschluß (REMOTE) (45 pol.)**
Zum Anschluß einer JVC-Fernbedienung.

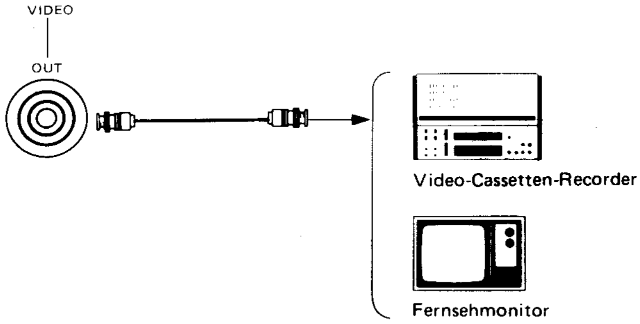
BEISPIEL FÜR ANSCHLÜSSE


Fernsehempfänger
zur Netzsteckdose
8 pol.
Video-Monitor
zur Netzsteckdose
Video-Cassetten-Recorder
VIDEO OUT
AUDIO OUT
Antenne
Antennenwähler
Antennenstecker
RF OUT
8 pol.
BNC-Typ
RCA-Typ
JVC
WARNING DANGEROUS VOLTAGE INSIDE
zur Netzsteckdose
BNC-Typ
Synchronsignalgeber
FRONTPLATTE
Kopfhörer
AUDIO MONITOR
DIN 5 pol.
Fernbedienung
RM-P53U
RM-P54U
Lautsprecher
Verstärker
Lautsprecher

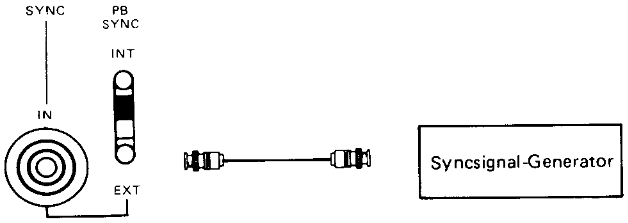
1. TV-Anschluß (8 pol.)


TV
Fernsehmonitor

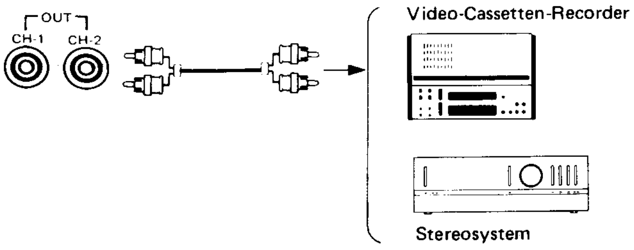
2. VIDEO OUT-Anschluß (BNC)


VIDEO
OUT
Video-Cassetten-Recorder
Fernsehmonitor

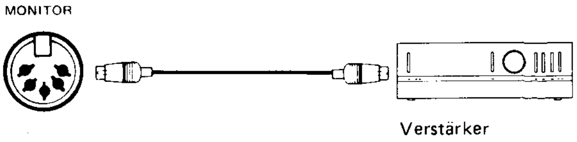
3. SYNC IN-Anschluß (BNC)


SYNC
IN
PB
SYNC
INT
EXT
Syncsignal-Generator

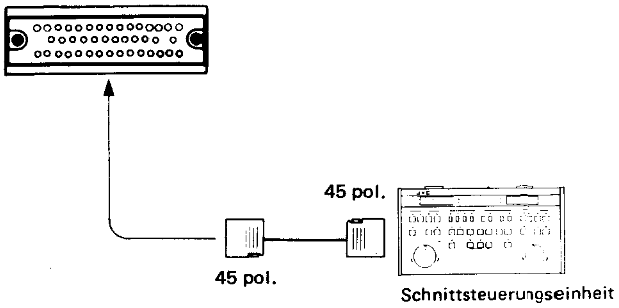
4. AUDIO OUT-Anschluß (RCA)


OUT
CH-1
CH-2
Video-Cassetten-Recorder
Stereosystem

5. AUDIO MONITOR-Anschluß (DIN)


MONITOR
Verstärker

6. REMOTE-Anschluß (45 pol.)


45 pol.
45 pol.
Schnittsteuerungseinheit

INSTALLATION DES HF-MODULATORS

Zum Installieren eines HF-Modulators die Abdeckung des HF-Modulator-Teils durch Lösen der beiden Schrauben abnehmen. Wenden Sie sich für ein geeignetes HF-Modulator-Modell an Ihren JVC-Fachhändler.

Wir empfehlen den Anschluß eines HF-Modulators mit einer der folgenden Teilebezeichnungen:

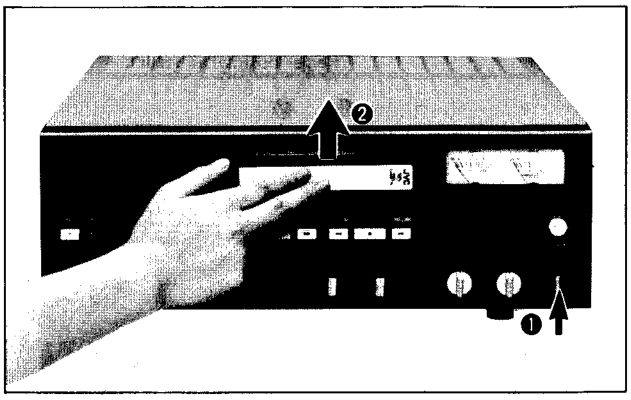
PU54120 für PAL-System G
PU54121 für PAL-System I
PU54122 für SECAM-System L
PU54123 für Australien

Hinweis:
Bei der Benutzung dieses Video-Players in Gebieten, in denen Bestimmungen zur Einschränkung elektromagnetischer Wellen gelten, ist der Anschluß eines anderen HF-Modulators als eines der oben aufgeführten Modelle untersagt.

EINLEGEN UND ENTNEHMEN EINER VIDEOCASSETTE

Einlegen

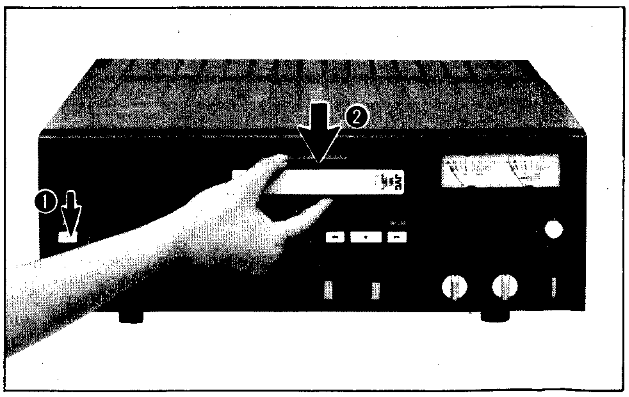
❶ Den Netzschalter (POWER) auf ON drücken. Die EJECT-Anzeige blinkt.



❷ Nachdem die EJECT-Anzeige zu blinken aufhört und konstant leuchtet, eine Cassette mit der beschrifteten Seite auf Sie zeigend einschieben. Die Cassette wird automatisch zurückgezogen und in die richtige Position geladen.
- Beim automatischen Laden der Cassette blinkt die STOP-Anzeige und leuchtet konstant, wenn die Cassette korrekt geladen wurde.
- Der automatische Lademechanismus arbeitet nur, wenn die Cassette korrekt in den Cassetten-Einschub eingeführt wird.
- Wenn die Cassette beim Laden nicht in die korrekte Position gebracht werden kann, wird sie automatisch nach etwa 6 Sekunden ausgeworfen.

Entnehmen

❶ Die EJECT-Taste drücken, während das Gerät auf Stopp steht. Die Cassette wird automatisch ausgeworfen.



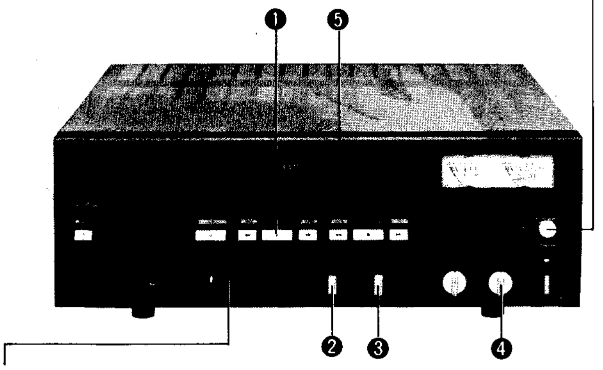
❷ Die Cassette vom Cassetten-Einschub entnehmen.
- Die EJECT-Anzeige blinkt beim automatischen Entladen der Cassette und leuchtet konstant nach dem Auswerfen.
- Die EJECT-Taste kann unmittelbar nach dem Drücken der STOP-Taste gedrückt werden. Die logische Steuerung speichert die Reihenfolge, stoppt zuerst den Player und wirft dann automatisch die Cassette aus.

WIEDERGABE

Normale Wiedergabe

❶ Eine bespielte Cassette einlegen.
❷ Den AUDIO MONITOR-Schalter wie erforderlich einstellen.

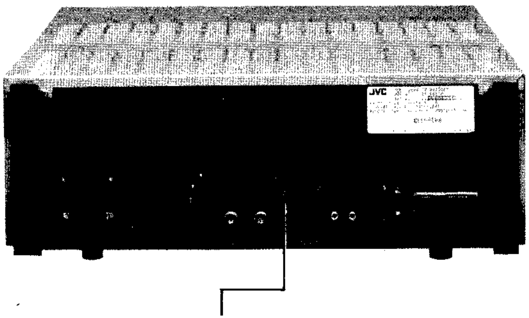
Wenn auf dem Bildschirm Störzeilen erscheinen, das Bild mit dem TRACKING-Regler optimal einstellen.



Zur Wiedergabe von Cassetten, die mit einem Rauschunterdrückungssystem aufgezeichnet wurden, den AUDIO NR-Schalter auf ON stellen.

❸ Den VIDEO MODE-Schalter wie erforderlich einstellen.
❹ Den VIDEO SYSTEM-Schalter wie erforderlich einstellen.
❺ Für Wiedergabestart die PLAY-Taste drücken. Das Band wird zuerst in den Bandtransportmechanismus gezogen, danach beginnt die Wiedergabe. Während des Ladens blinkt die PLAY-Anzeige und leuchtet danach konstant.

Wiedergabesynchronisierung



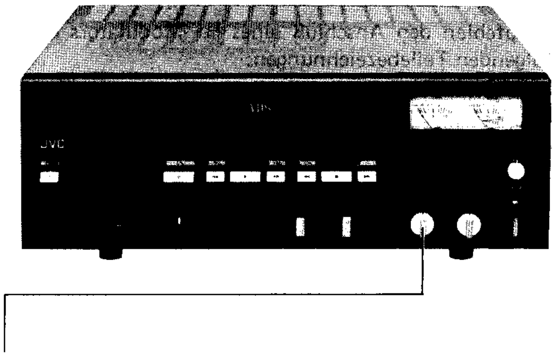
PB SYNC
Auf EXT stellen, wenn die Wiedergabe mit einem externen Sync-Signal synchronisiert werden soll. (Zum Synchronisieren ein Sync-Signal oder ein BAS-Signal verwenden.)

Hinweis:

- Wenn bei der Wiedergabe das Bandende erreicht wird, wird das Band automatisch aus dem Bandtransportmechanismus zurückgezogen, zurückgespult und am Bandanfang gestoppt.

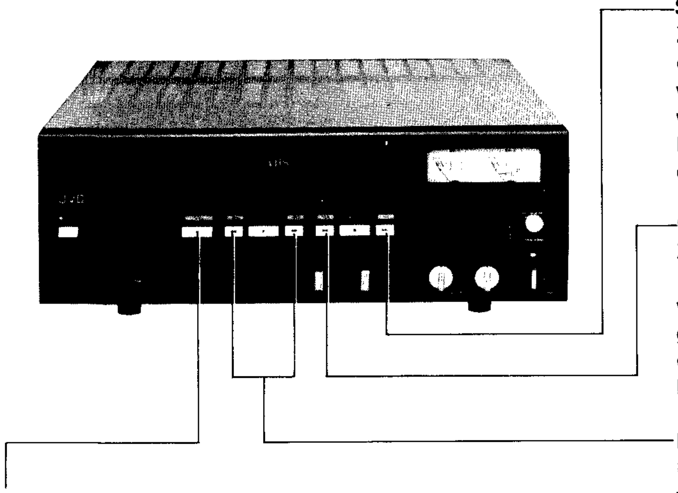
Abspielwiederholung

Je nach Stellung des MEMORY-Schalters, stehen drei verschiedene Wiederholungsfunktionen zur Verfügung.



⟲	Automatische Wiederholung der gesamten Cassette.
0000→	Abspielwiederholung eines Bandabschnitts, beginned mit der Zählwerkstellung Null bis zum Erreichen des Bandendes.
→0000	Abspielwiederholung eines Bandabschnitts, beginnend vom Bandanfang bis zum Erreichen der Zählwerkstellung Null.

WEITERE FUNKTIONEN



SCHNELLVORLAUF

Zum Schnellvorlauf des Bandes die FF-Taste drücken. Wenn die FF-Taste während Wiedergabe oder Standbild gedrückt wird, wird das Band in die Cassette zurückgezogen und dann vorgespult. Beim Zurückziehen des Bandes in die Cassette blinken die FF- und die STOP-Anzeige und zeigen damit an, daß der Befehl für Schnellvorlauf gespeichert ist.

RÜCKSPULEN

Zum Rückspulen des Bandes die REW-Taste drücken. Wenn die REW-Taste während Wiedergabe oder Standbild gedrückt wird, wird das Band in die Cassette zurückgezogen und dann zurückgespult. Beim Zurückziehen des Bandes in die Cassette blinken die REW- und die STOP-Anzeige und zeigen damit an, daß der Befehl für Rückspulen gespeichert ist.

STANDBILD-WIEDERGABE

Zuerst durch Drücken der PLAY-Taste auf Wiedergabe schalten und dann die STILL-Taste drücken. Die STILL-Anzeige leuchtet, das Bild wird augenblicklich "eingeforen".

Zur Freigabe des Standbildes die PLAY-Taste drücken.

Hinweis:

Wenn während der Wiedergabe die STILL-Taste gedrückt gelassen wird, verschwindet das normale Standbild nach 2 oder 3 Minuten. Dies beruht darauf, daß die Zugspannung zum Schutz des Bandes automatisch reduziert wird, und läßt nicht auf einen Defekt des Gerätes schließen.

BILDSUCHLAUF

Der Bildsuchlauf ermöglicht, jede Bandstelle schnell zu finden, während das Wiedergabebild auf dem Monitorschirm betrachtet wird. Die Bandgeschwindigkeit beträgt etwa das Zehnfache der normalen Geschwindigkeit, der Bildsuchlauf ist möglich in beide Richtungen, entweder vorwärts oder rückwärts.

- Zuerst auf Wiedergabe schalten und dann, abhängig von der Richtung, in der sich die gesuchte Stelle befindet, entweder die REV- oder die FWD-Bildsuchlauf-Taste drücken. Wenn die gesuchte Szene erscheint, abhängig von der gewünschten nächsten Wiedergabeart die PLAY- oder die STILL-Taste drücken.

STÖRUNGSSUCHE

Was zuerst wie eine Störung erscheint muß nicht immer ernsthaft sein. Bevor Sie sich an Ihren JVC-Fachhändler wenden, überprüfen Sie bitte . . .

Störung	Bitte prüfen Sie
Schnee im Bild.	● Wenn für Wiedergabe ein Fernsehempfänger verwendet wird, überprüfen, ob der Kanalwähler des Fernsehempfängers auf den Kanal des HF-Modulators eingestellt wurde. ● Den TRACKING-Regler langsam drehen, bis das Bild klar wird.
Band stoppt unerwartet.	● Die Einstellung des MEMORY-Schalters überprüfen.
Keine Anzeige am Audio-Meßinstrument für Kanal 2.	● Überprüfen, ob der Meßinstrument-Funktionswahlschalter auf die Position für Tracking-Meßinstrument eingestellt ist.

Hinweis: Wenden Sie sich an Ihren JVC-Fachhändler, wenn die POWER-Anzeige blinkt.

TECHNISCHE DATEN

ALLGEMEIN

Format : VHS 1/2" (12,65 mm)
Spannungsversorgung : 100/120/220/240 V∿, 50/60 Hz
Leistungsaufnahme : 76 Watt (mit der Automatischen Schnittsteuerungseinheit, 12 V ⎓ , 0,55 A)
Abmessungen : 44,0(B) x 16,4(H) x 44,8(T) cm
Gewicht : 17,5 kg
Betriebstemperatur : 5° C bis 40° C
Lagerung : -20° C bis 60° C
Betriebslage : Nur horizontal
Bandgeschwindigkeit : 23,39 mm/Sek. (PAL/SECAM)
33,35 mm/Sek. (NTSC)
Suchlauf-Geschwindigkeit : Bildsuchlauf Vorwärts/Rückwärts
±10X Variabel 0 ~ ±5X, ±10X

VIDEO

Wiedergabe-System : Rotierendes Zweikopfsystem, Schrägspurabtastung mit im Winkel versetzten Köpfen
Videosignalsystem : PAL/SECAM/NTSC 4,43
Ausgang Line/TV : 1,0 Vs-s, 75 Ohm, unsymmetrisch
Störspannungsabstand : Monochrom: 43 dB
(Rohde und Schwarz Geräuschmesser)
Horizontale Auflösung : Monochrom: 250 Zeilen (PAL)
240 Zeilen (SECAM)
Sync-Eingang : 0.5 bis 4 Vs-s, 75 Ohm, unsymmetrisch
Sync-Wahl : INT/EXT

AUDIO

Ausgang Line : -6 dBs, an 10 kOhm, unsymmetrisch
Monitor : 0 dBs, an 10 kOhm, unsymmetrisch (CH-1/MIX/CH-2)
Kopfhörer : HIGH/MED/LOW 8 bis 300 Ohm, unsymmetrisch
TV : 0 dBs, niedrigohmig, unsymmetrisch
Störspannungsabstand : Mehr als 47 dB (NR eingeschaltet), 42 dB (NR ausgeschaltet) (bei 3 % Klirrfaktor)
Frequenzgang : 40 bis 12.000 Hz
Monitor-Ausgangswahl : CH-1/MIX/CH-2

ANSCHLÜSSE

Video-Ausgang : BNC
Sync-Eingang : BNC
HF-Ausgang : Antenne
TV-Ausgang : EIAJ 8 pol. TV-Stecker
Audio
Line-Ausgang : RCA-Stiftstecker
Monitor-Ausgang : DIN 5 pol.
Kopfhörer : 6-mm-Buchse
Fernbedienung : 45 pol. Anschluß
Netzeingang : 3 pol. Netzanschluß
Zubehör : 1 Satz

Technische Änderungen vorbehalten.

SECTION 1
GENERAL DESCRIPTION

1.1 GENERAL OUTLINE

The VHS system achieves very low tape consumption and uses low cost video cassette tape. Recording time has become 3 hours.

Increased recording time results from the narrow gap video heads, high sensitivity video tape and the slant azimuth recording head configuration which eliminates the need for a guard band between recorded tracks. In addition, the VHS format takes into consideration special operating modes such as still picture, slow motion and speed playback.

Adoption of the VHS format presented several technical challenges. Foremost among these were obtaining high picture quality and high resolution despite the slow (4.9 meters per second) relative speed between the tape and video heads, improving signal to noise ratio (S/N), and preventing black to white reversal phenomena due to the short recording wavelength of 1.0 μm. Also the $\pm 6^\circ$ azimuth angle of the video heads alone is not sufficient to eliminate crosstalk from the lowband converted color signal.

These difficulties were surmounted by selecting both the circuit design and emphasis amount for optimum S/N. The reversal problem was overcome by using a double limiter circuit, while a phase shift system has been designed for eliminating color crosstalk.

The BR-6400TR and BP-5300TR are designed to meet the varied and demanding requirements of institutional video. Special attention has been paid to the critical head drum and tape transport mechanism for heavy-duty use and reliability. Independent DC motors drive the head drum (controlled by drum servo circuit), capstan (controlled by capstan servo circuit) and the reels (controlled by reel servo circuit). In addition, the electrical tape tension control is performed by the reel servo circuit. The aluminum die cast chassis is adopted to support rigorous and heavy-duty use for institutional applications. A motorized front cassette loading system is used for the cassette housing which automatically performs loading and unloading of the cassette. The system control circuit, which employs microprocessor-based full logic control, coordinates the electrical and mechanical functions of the machine to properly implement the various operating modes.

High speed search function is used for quick picture search in both forward and reverse directions at a speed 10 times normal. The key editing feature is that the tape playback speed can be varied continuously from still to 5 times normal in both forward and reverse directions, using a remote control unit (optional). By employing a four-head upper drum, clean one-field still and slow pictures without blur can be played back.

The audio circuit has two audio channels for stereo sound, bilingual applications or audio dubbing. Dolby* noise reduction is included for improved sound quality. For more elaborate editing, direct interfacing with JVC's Automatic Editing Control Unit is possible.

Mechanism and electrical descriptions of BR-6400TR BP-5300TR are described in section 2 and 3.

* Dolby is a trademark of Dolby Laboratories.

SECTION 2
MECHANISM DESCRIPTION

2.1 GENERAL

The mechanical parts of this model have been considerably reduced in comparison to previous machines, resulting a simplified mechanism. Reliability is enhanced by the diecast aluminum chassis, while the video head drum, capstan and reels are driven directly by independent DC motors.

Video cassette insertion and removal are easily performed with the aid of motorized automatic front loading system. The six motors and four solenoids are controlled by the microprocessor of the system control circuit which contributes to precise and reliable operation.
A description of the main mechanical functions is provided as follows.

2.2 MAIN COMPONENT OPERATIONS

2.2.1 Motors

1. Drum motor
   A direct drive (DD) motor is used in conjunction with a drum servo circuit to control video head rotation.
2. Capstan motor
   The capstan motor includes a DC motor, capstan FG, flywheel and capstan. During recording, playback, search and slow modes, the capstan motor is controlled by capstan servo circuit and drives the capstan in forward and reverse directions.

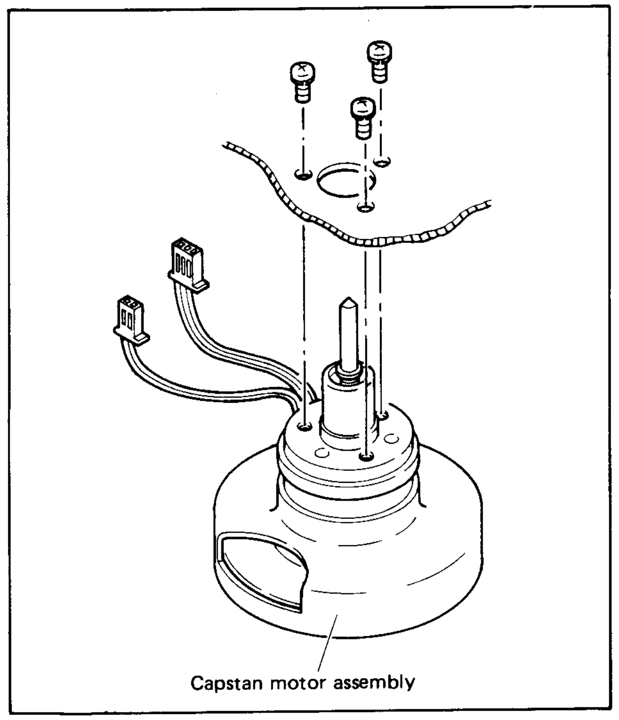

Capstan motor assembly

Fig. 2-2

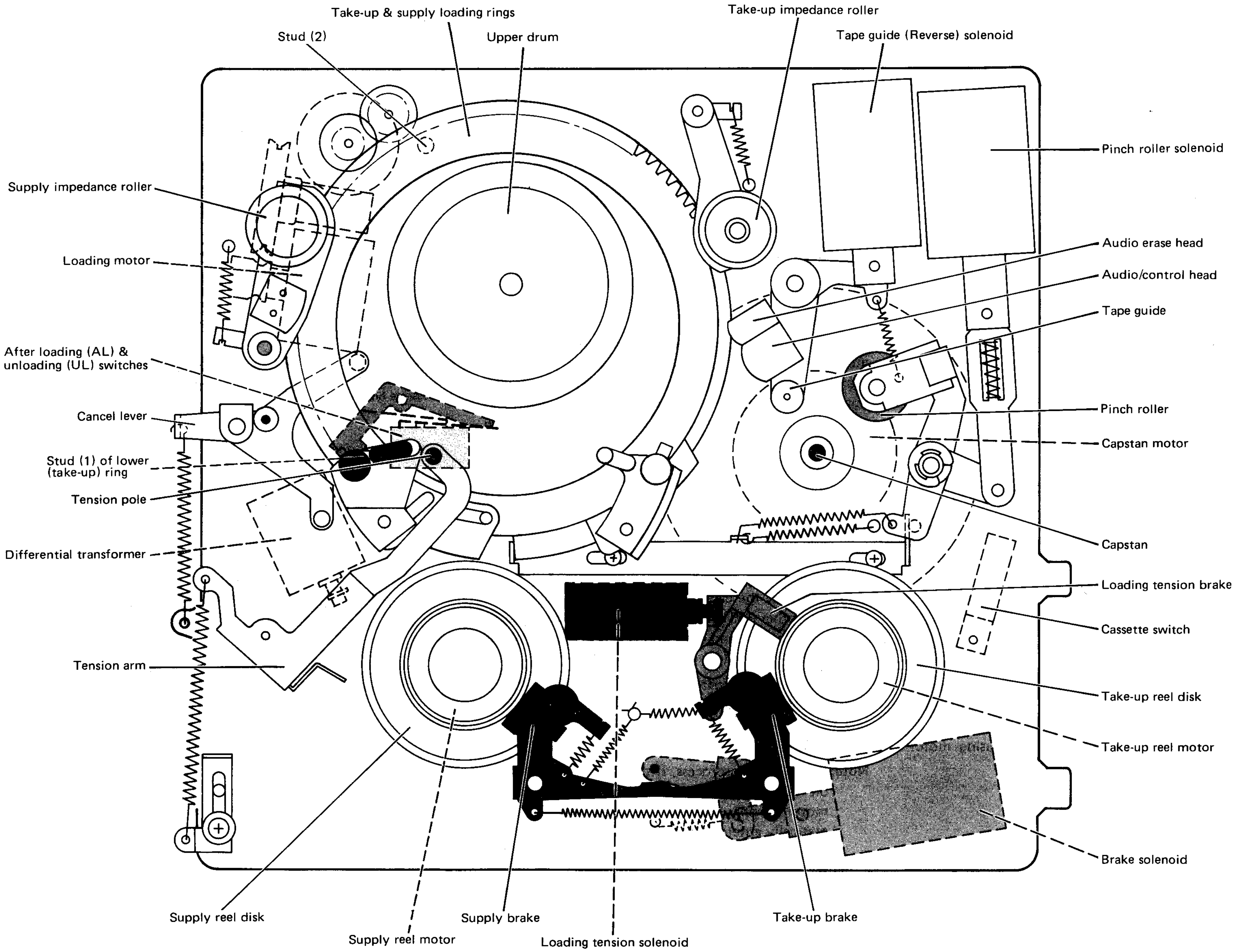

Take-up & supply loading rings
Stud (2)
Upper drum
Take-up impedance roller
Tape guide (Reverse) solenoid
Supply impedance roller
Loading motor
After loading (AL) & unloading (UL) switches
Cancel lever
Stud (1) of lower (take-up) ring
Tension pole
Differential transformer
Tension arm
Pinch roller solenoid
Audio erase head
Audio/control head
Tape guide
Pinch roller
Capstan motor
Capstan
Loading tension brake
Cassette switch
Take-up reel disk
Take-up reel motor
Brake solenoid
Supply reel disk
Supply reel motor
Supply brake
Loading tension solenoid
Take-up brake

Fig. 2-1 Main parts Location

3. Reel motors
   Supply and take-up reel motors are controlled by the reel servo circuit and directly drive the reels in forward and reverse directions.

4. Loading motor
   The loading motor drives the loading rings to extract the tape from the cassette during loading and return it to the cassette during unloading.

   The loading motor rotation goes via the loading belt to the loading gear train composed of worm, wormwheel and relay gears. The supply loading ring is driven via the worm and wormwheel gears, while drive for the take-up loading ring is transmitted by the relay gear.

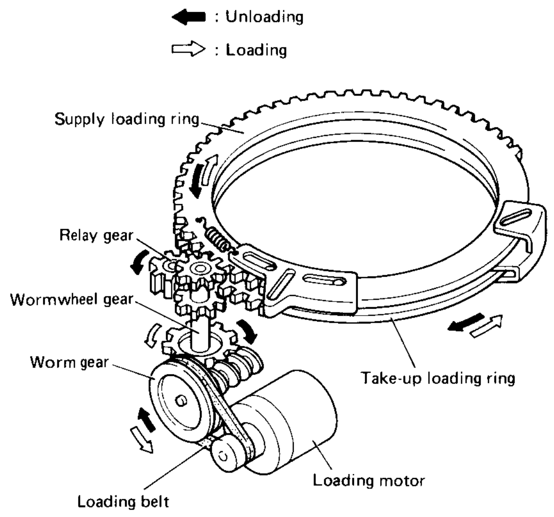


Fig. 2-3 Loading ring drive mechanism

5. Cassette housing motor
   When a cassette tape is inserted slightly into the front panel slot, the cassette housing motor moves the cassette in the loading direction.
   In the Eject mode, the cassette housing motor rotates in the unloading direction.

2.2.2 Solenoids

1. Brake solenoid
   According to the selected mode, the brake solenoid functions to engage or release the supply and take-up brakes.

2. Pinch roller solenoid
   This solenoid engages and release the pinch roller pressure. At the rotation end of the take-up loading ring, the stud at the lower side of the take-up loading ring switches on the AL (after loading) switch, then the pinch roller solenoid is engaged.

3. Tape guide (Reverse) solenoid
   This solenoid is energized so that the tape guide does not contact the video tape when the tape travels in the Reverse Search mode.

4. Loading tension solenoid
   The loading tension solenoid operates in all modes except the Stop, Loading and Unloading modes in order to release the loading tension brake from the take-up reel disk.

2.2.3 Cassette housing

A motorized front loading system is used for the cassette housing which automatically performs loading and unloading of the cassette tape.

Fig. 2-4(a) indicates the state before a cassette is inserted. Inserting a cassette forces the roller and sprocket gear-2 upwards. This pulls the chain taut and the shutter blocks the cassette sensor. The cassette housing motor rotates in the loading direction.
This rotation is transferred in the route: cassette housing motor → cassette belt → worm → relay gear → sprocket gear-1 → chain. The chain turns counter-clockwise. Sprocket gear-2 and the roller also turn counter-clockwise, and the cassette slides toward the right, as shown by Fig. 2-4(b).

When the cassette is fully positioned, it presses the slide plate toward the right. The chain pin of the slide plate shifts toward the right and engages a link of the chain. As the chain rotates, the slide plate and housing are lowered by gears. This is illustrated in Fig. 2-4(c).

After lowering into the chassis, the cassette switch becomes on, but the cassette housing motor continues to turn for another 300 msec. This compensates for possible switch timing error and ensures proper positioning of the housing. See Fig. 2-4(d).

Pressing the EJECT button begins the unloading process, which starts after the stop state is reached. In the Eject mode, the cassette housing motor rotates in the unloading direction.

Note: In the loading process, if the cassette switch is not on within 5 seconds after the cassette housing motor begins rotating, the Eject mode is automatically entered.

Notes:
1. Take-up and other rotational torque values are determined by voltages applied to the motors.
2. Since all mechanism functions are determined electrically, also refer to the electrical circuit descriptions of this manual.

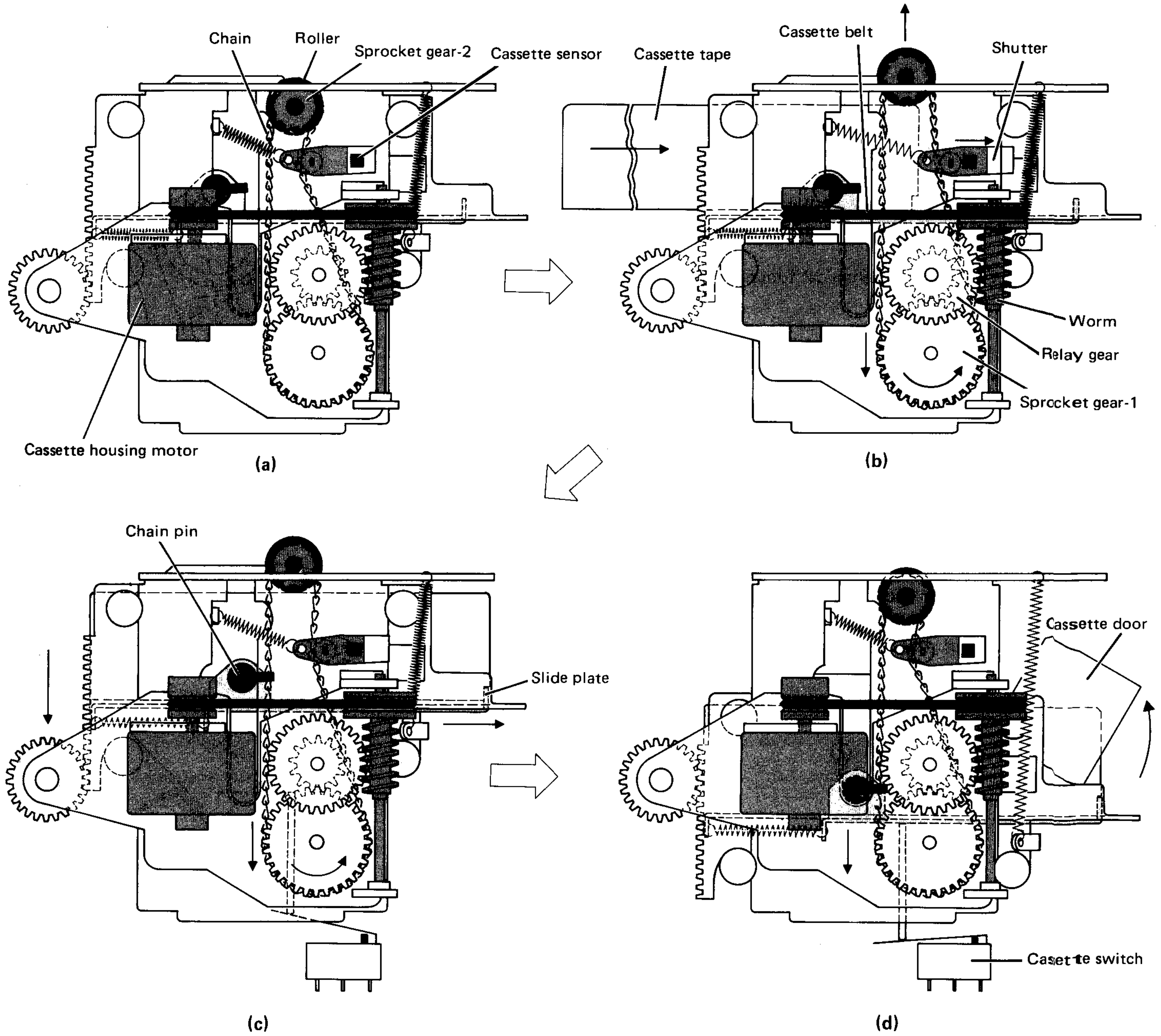


Fig. 2-4 Cassette housing system

2.3 MODE DESCRIPTIONS

2.3.1 Stop mode

Fig. 2-5 shows a top view of the mechanism in the Stop mode with the cassette housing removed.

The Stop mode is the state which allows a cassette to be inserted or removed. At this time, the motors and solenoids are not electrically operating.

With a cassette inserted, the supply pole base, take-up pole base and tension pole become positioned at the inner side of the tape in readiness for extracting it from the cassette. The pinch roller is separated from the capstan at a position where it does not interfere with insertion and removal of the cassette.

Supply and take-up brakes are applied to both reel disks to prevent uncontrolled rotation. The brakes serve to avoid tape slackening, which could cause damage to the tape during loading and when removing the cassette.

The unloading (UL) switch is on and the after loading (AL) switch is off.

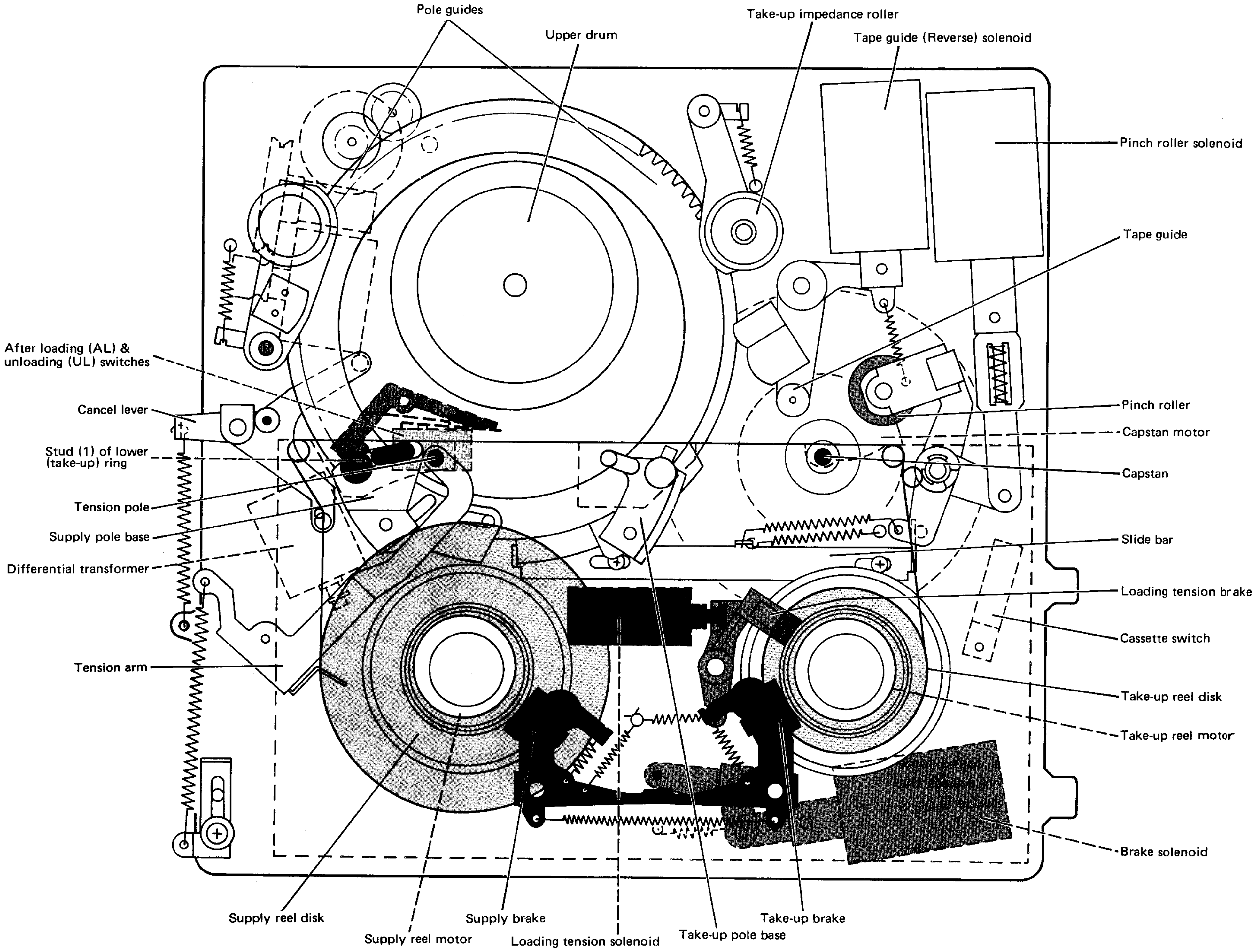

Pole guides
Upper drum
Take-up impedance roller
Tape guide (Reverse) solenoid
Pinch roller solenoid
Tape guide
After loading (AL) & unloading (UL) switches
Cancel lever
Stud (1) of lower (take-up) ring
Tension pole
Supply pole base
Differential transformer
Tension arm
Pinch roller
Capstan motor
Capstan
Slide bar
Loading tension brake
Cassette switch
Take-up reel disk
Take-up reel motor
Brake solenoid
Supply reel disk
Supply reel motor
Supply brake
Loading tension solenoid
Take-up pole base
Take-up brake

Fig. 2-5 Stop mode

2.3.2 Loading mode

During this mode, the tape is extracted from the cassette and set in the specified position. When the PLAY button is pressed in the Stop mode, the brake solenoid switches on and the loading motor begins rotating.

To allow smooth extraction and reduce load on the tape, the supply and take-up brakes are released from the reel disks. However, since complete absence of load could cause tape slackening due to mechanical inertia, torque is applied from both the supply and take-up reel motors, and the loading tension brake is applied to the take-up reel disk.

Loading motor rotation is transferred to the loading rings, which includes the slide rings. Refer to section 2.2.1 item 4 Loading motor. Each pole base is mounted directly to the sub deck with the pin of the pole base engaged with the slot of its corresponding slide ring.

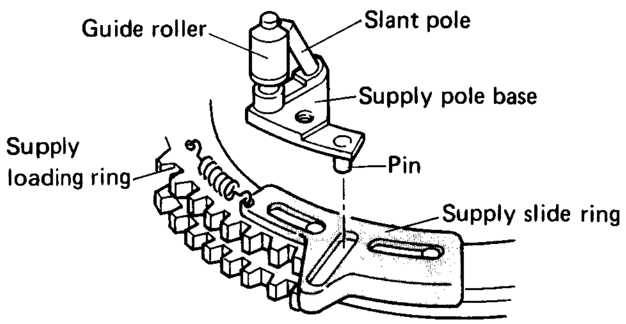

Guide roller
Slant pole
Supply pole base
Supply loading ring
Pin
Supply slide ring

Fig. 2-6 Supply loading ring

As the loading ring rotates, the rotation is transferred to the pole base, which moves in the guide groove of the sub deck. The slant pole and guide roller of the pole base begin extracting the tape from the cassette.

With further rotation of the loading ring, spring force shifts the slide bar toward the right. This presses the pinch roller arm, which turns counter-clockwise to bring the pinch roller in proximity to the capstan.

The drum motor begins rotating about 0.4 seconds after the PLAY button is pressed.

With supply ople base movement, spring force turns the tension arm counter-clockwise to uhere it is stopped by the cancel lever.

As loading continues further, the supply pole base carries the tape while pressing the erase head arm aside. When the supply pole base reaches a certain point, spring force returns the erase head arm to its original position and the impedance rollers contact the tape.

The impedance rollers serve to dampen longitudinal fluctuations of the tape, which may contribute to picture jitter and audio wow & flutter. The pole bases are stopped by the pole guides of the sub deck, but the loading rings continue to turn until the AL switch becomes on.

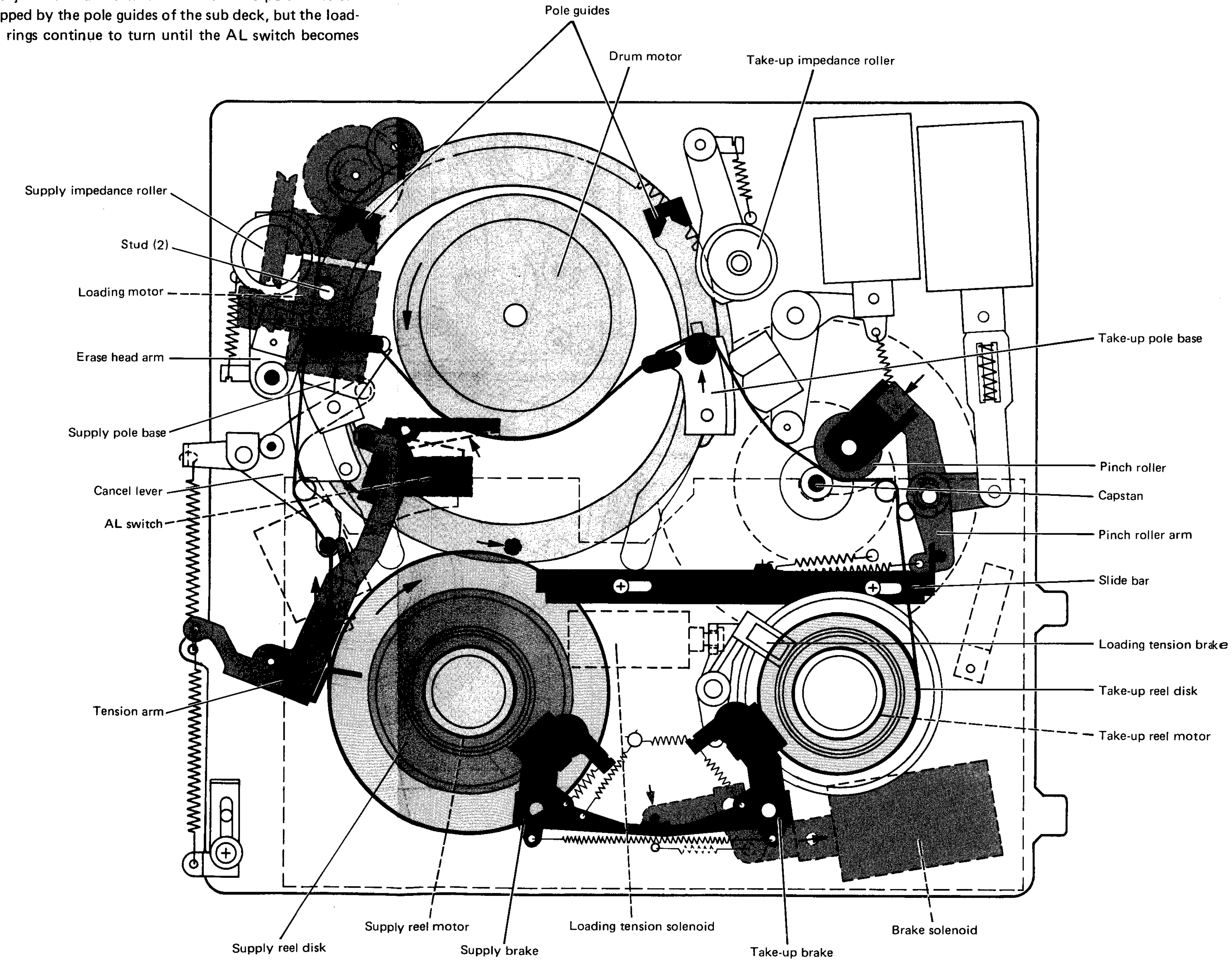

Pole guides
Drum motor
Take-up impedance roller
Supply impedance roller
Stud (2)
Loading motor
Erase head arm
Supply pole base
Cancel lever
AL switch
Tension arm
Take-up pole base
Pinch roller
Capstan
Pinch roller arm
Slide bar
Loading tension brake
Take-up reel disk
Take-up reel motor
Supply reel disk
Supply reel motor
Supply brake
Loading tension solenoid
Take-up brake
Brake solenoid

Fig. 2-7 Loading mode

2.3.3 Unloading mode

At the end of the tape, or if the STOP button is pressed during normal play, the pinch roller and loading tension solenoids switch off and the capstan motor stops. The loading motor rotates to shift the pole bases toward the cassette.

Tape protruding from the cassette is taken up by the supply reel.

Spring force turns the cancel lever counter-clockwise to release the tension arm. The supply pole base presses the tension arm and returns to its position within the cassette.

When the take-up pole base returns to the cassette, the slide ring of the take-up loading ring shifts the slide bar toward the left. This produces a larger separation between the pinch roller and capstan.

At the time the supply pole base, tension pole and take-up pole base are fully returned to the cassette, the stud of the take-up loading ring sets the unloading switch on. This stops the loading, reel and drum motors, and the brake solenoid switches off to yield the Stop mode.

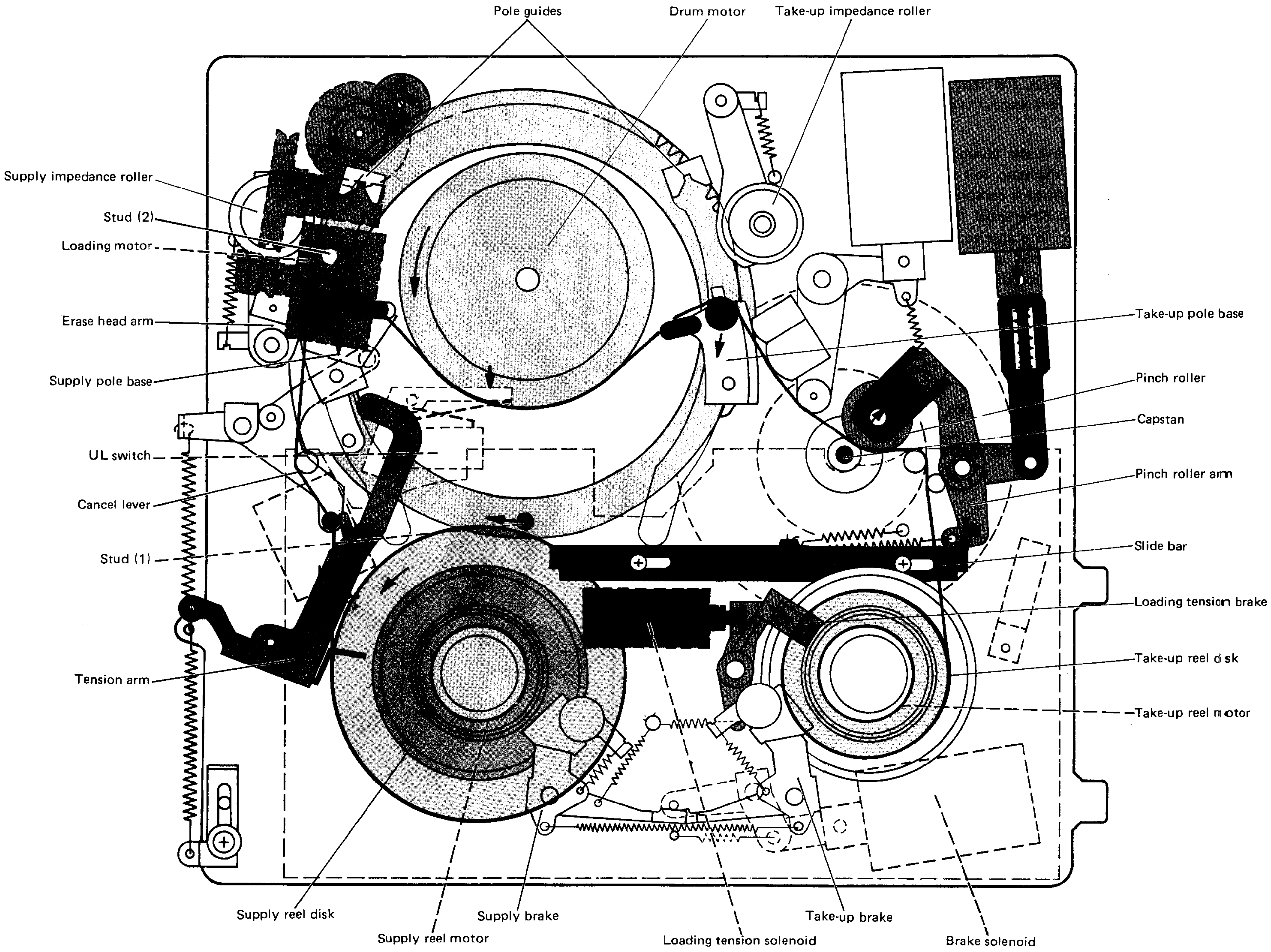

Pole guides
Drum motor
Take-up impedance roller
Supply impedance roller
Stud (2)
Loading motor
Erase head arm
Supply pole base
UL switch
Cancel lever
Stud (1)
Tension arm
Take-up pole base
Pinch roller
Capstan
Pinch roller arm
Slide bar
Loading tension brake
Take-up reel disk
Take-up reel motor
Supply reel disk
Supply reel motor
Supply brake
Loading tension solenoid
Take-up brake
Brake solenoid

Fig. 2-8 Unloading mode

2.3.4 Play/Recording mode

As the loading process continues, the stud of the take-up loading ring imparts clockwise rotation to the cancel lever. The cancel lever shifts to where it sets the AL switch on and the loading motor stops. At the same time, the pinch roller solenoid energizes, the capstan motor starts turning and the pinch roller engages the capstan to begin tape transport.

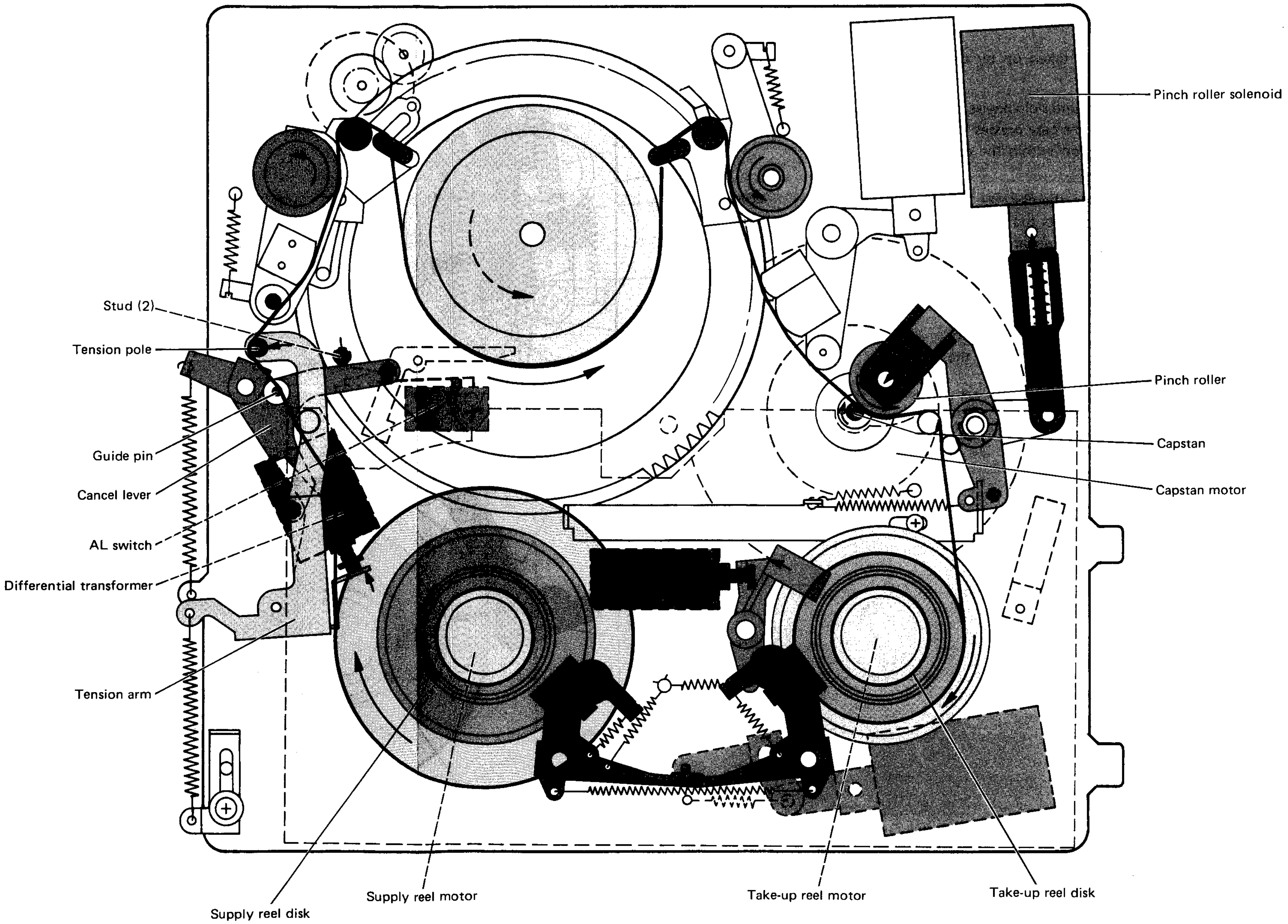
The tension pole detects tape back tension and the supply reel motor rotates to maintain this at a fixed value. Detector for tension control is comprised of the tension pole, tension arm and differential transformer which convert the pole position into an electrical value. The differential transformer output goes to the reel servo circuit, which controls rotation of the supply reel motor.

2.3.5 Still and Pause mode

Pressing the PAUSE/STILL button during the Play or Recording mode stops the capstan motor. The tape motion stops, while the pinch roller remains engaged and the drum motor continues to rotate.
Again pressing the PLAY button resumes capstan motor rotation and tape travel.

2.3.6 Forward (FWD) Search mode

When the FWD button is pressed during Play or Still mode, the tape becomes transported by the capstan motor at about 10 times normal in the forward direction. Mechanism operation is the same as in the Play mode.



Pinch roller solenoid
Stud (2)
Tension pole
Pinch roller
Capstan
Guide pin
Capstan motor
Cancel lever
AL switch
Differential transformer
Tension arm
Supply reel disk
Supply reel motor
Take-up reel motor
Take-up reel disk

Fig. 2-9 Play/Recording mode

2.3.7 Reverse (REV) Search mode

While the Play or Still mode is in progress, pressing the REV button yields the Still mode briefly, then the tape guide (reverse) solenoid switches on and the capstan motor rotates to transport the tape in the reverse direction at about 10 times normal play speed.
Other mechanism operations are the same as in the Play mode.

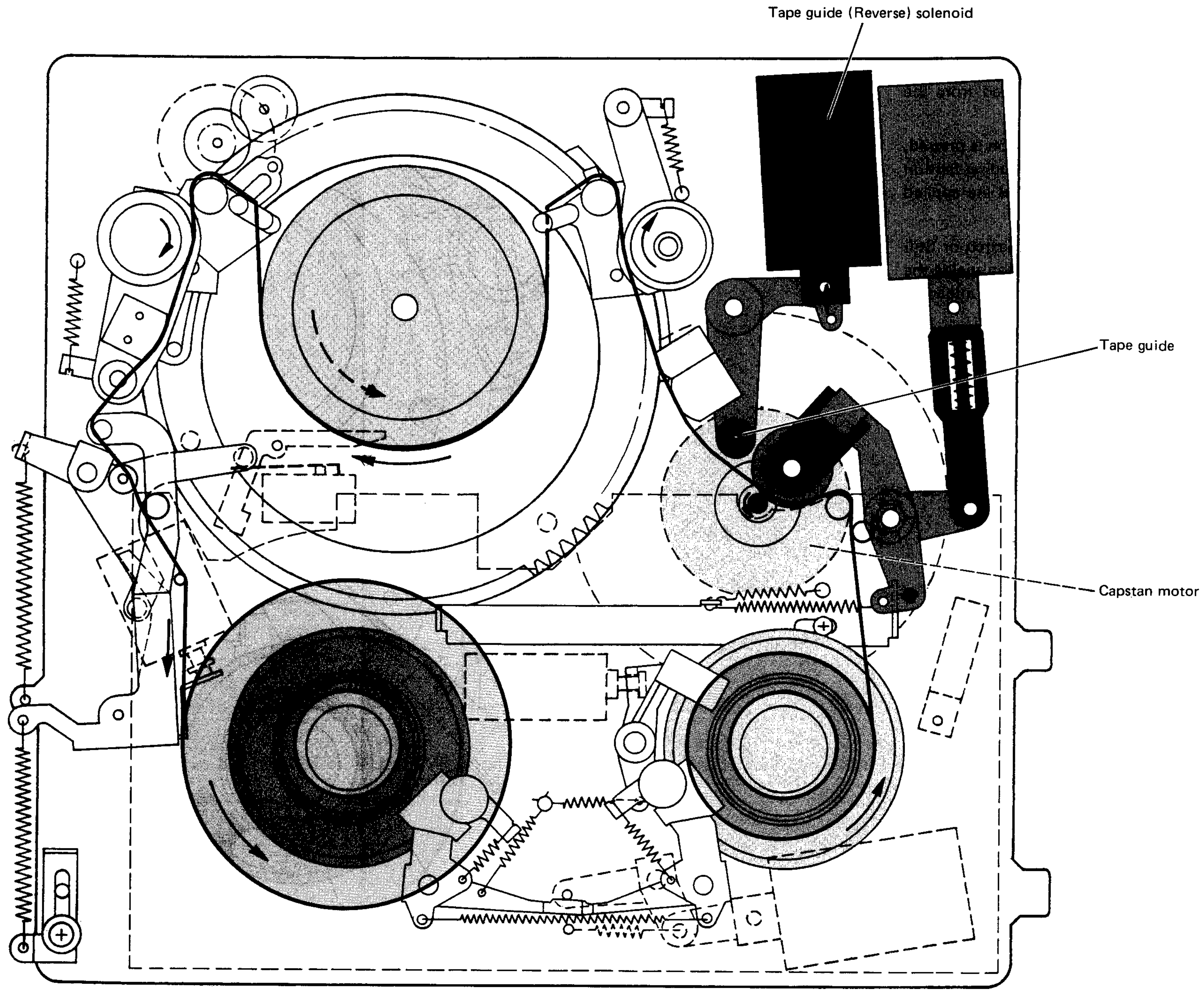

Tape guide (Reverse) solenoid
Tape guide
Capstan motor

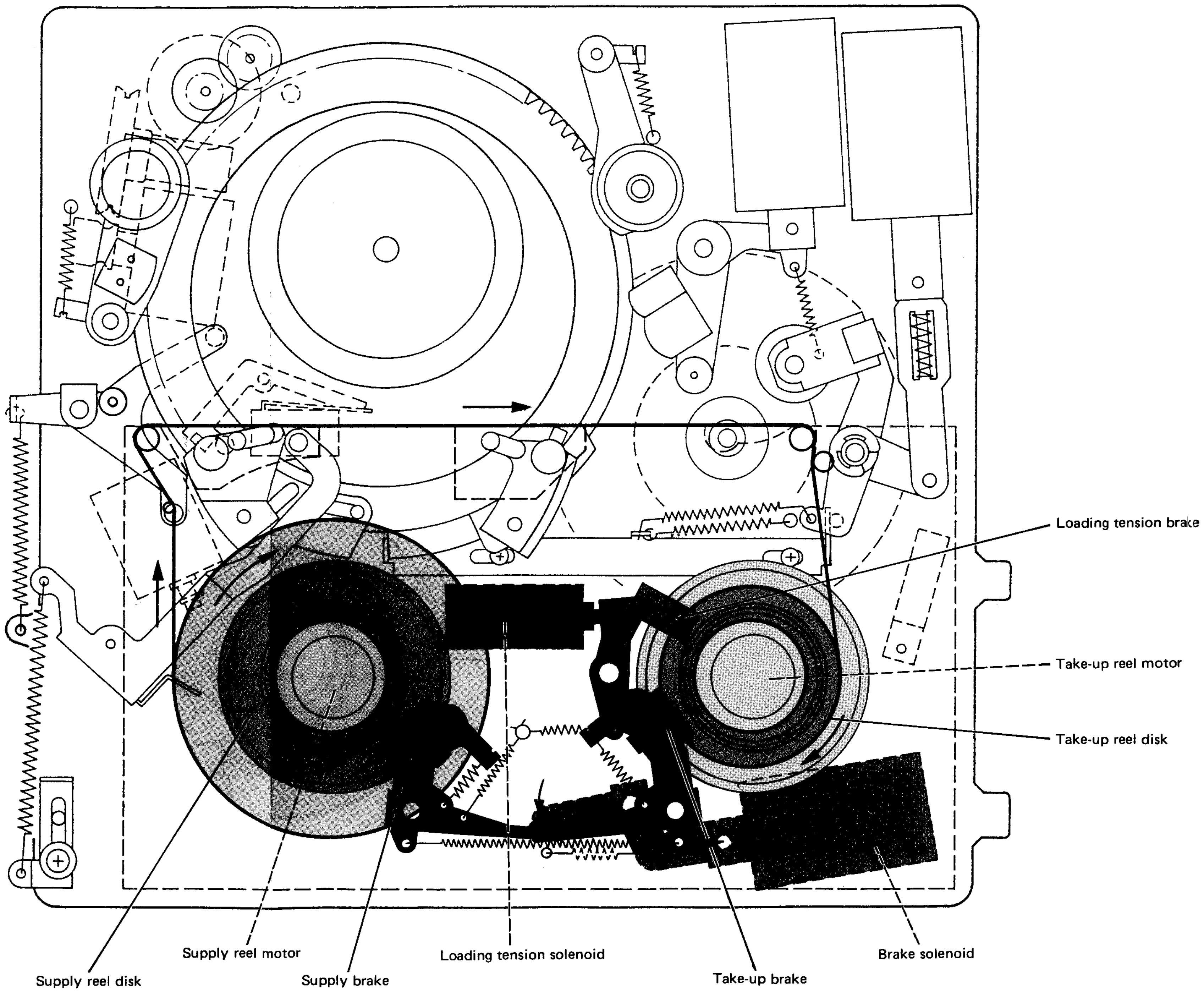
Fig. 2-10 Reverse Search mode

2.3.8 FF (fast forward) mode

Pressing the FF button in the Stop mode switches on the brake and loading tension solenoids. The supply, take-up and loading tension brakes are released, freeing the reel disks, and the reel motors turn in the forward direction. The tape in the cassette becomes transferred from the supply to the take-up reel.

At the end of tape or when the STOP button is pressed, the reel motors stop and the brake and loading tension solenoids switch off. All mechanical brakes are applied to the reel disks and tape motion stops.

While the Play, Forward Search, Reverse Search or Still mode is in progress, pressing the FF button yields the unloading mode at first. After completing the unloading operation, the FF mode is produced.



Loading tension brake
Take-up reel motor
Take-up reel disk
Supply reel motor
Loading tension solenoid
Brake solenoid
Supply reel disk
Supply brake
Take-up brake

Fig. 2-11 FF mode

2.3.9 REW (rewind) mode

Pressing the REW button in the Stop mode switches on the brake and loading tension solenoids. The supply, take-up and loading tension brakes are released, freeing the reel disks, and the reel motors turn in the reverse direction. The tape in the cassette becomes transferred from the take-up to the supply reel.

At the beginning of tape or when the STOP button is pressed, the reel motors stop and the brake and loading tension solenoids switch off. All mechanical brakes are applied to the reel disks and tape motion stops.

While the play, Forward Search, Reverse Search or Still mode is in progress, pressing the REW button yields the unloading mode at first. After completing the unloading operation, the REW mode is produced.

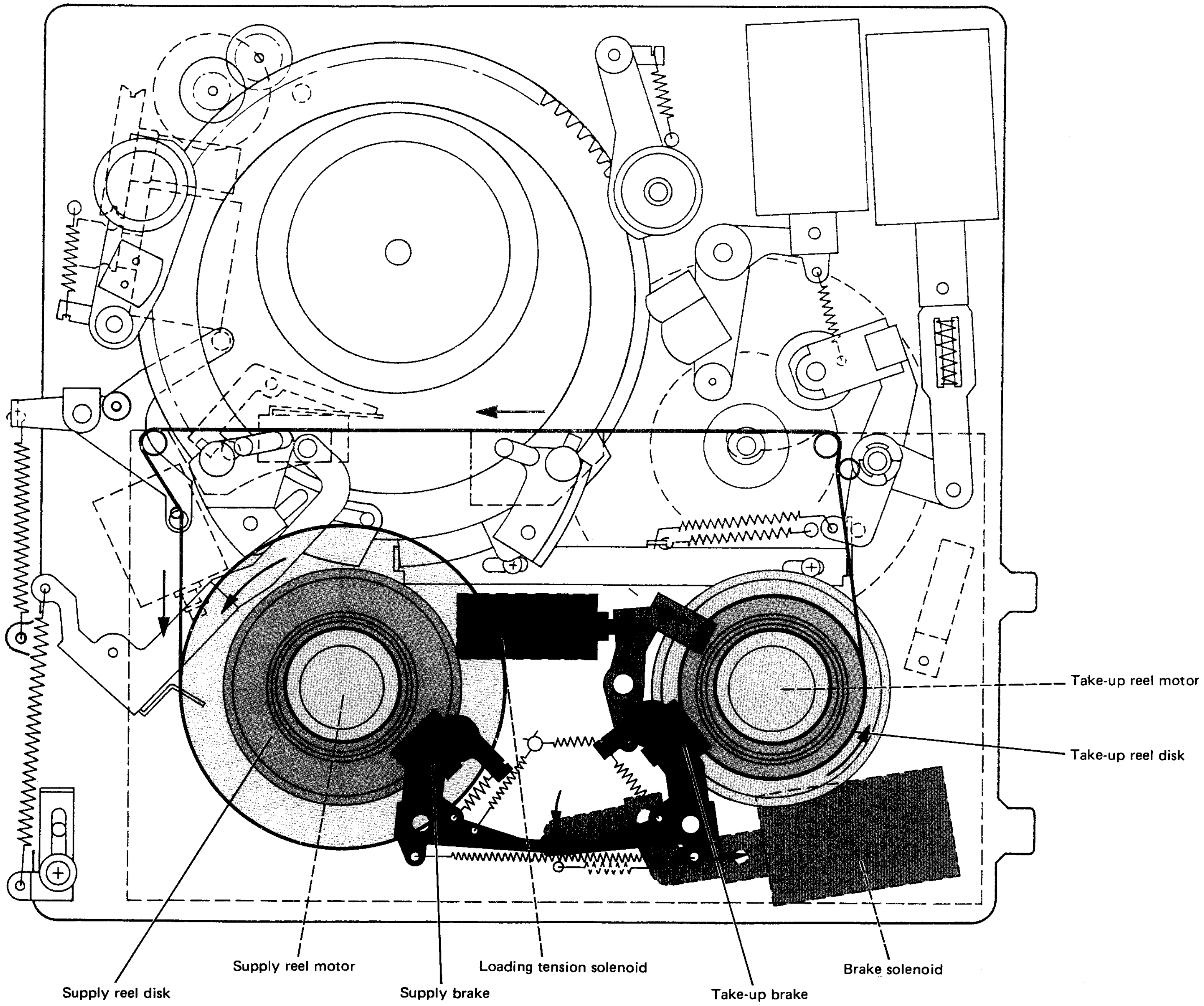

Take-up reel motor
Take-up reel disk
Supply reel disk
Supply reel motor
Supply brake
Loading tension solenoid
Take-up brake
Brake solenoid

Fig. 2-12 REW mode

SECTION 3
CIRCUIT DESCRIPTION

3.1 GENERAL

The electronic circuits are distributed among thirteen major circuit boards: preamplifier and recording amplifier (PRE/REC), liminance (Y), PAL & NTSC chrominance (CHROMA), SECAM chrominance, audio, system control (SYSCON), reel servo, capstan servo, drum servo, power supply, junction, counter, and operation (A).
Since the BP-5300TR is a playback only unit, it does not contain recording circuts.
The following description pertains mainly to the BR-6400TR circuits.

3.2 SYSTEM CONTROL CIRCUIT (SYSCON)

3.2.1 General

The system control circuit is distributed among the 30 SYSCON, 33 JUNCTION, 34 COUNTER, 35 OPERATION, 65 SYSCON sub, 11 Y, 40 AUDIO, 22 DRUM, 21 CAPSTAN and 20 REEL boards.

Among the objectives of this system are to supply other circuits with mode control signals produced by the operating keys, drive the transport mechanism and prevent serious damage to the machine and tape in event of malfunction or operating error.

This model features both "feather touch" operation from the mainframe and remote control by using an accessory remote control unit. Based on these signals, the syscon functions to operate the motors and solenoids and to set up the specified mode.

Most of these functions are controlled by microcomputer circuitry. Various sensors continuously monitor the states of critical components, by which the decision is made to continue or terminate the mode in progress, or shift to another mode.

3.2.2 Block diagram description

The simplified block diagram in shown in Fig. 3-28.

Key inputs from the operation board and the various sensor signals are supplied to the syscon. These are sampled at regular intervals and entered into the microcomputer. Based on these inputs, the microcomputer interprets the mode and accordingly drives the loading and reel motors and sends instructions for rotational direction and speed to the servo circuit. Tape transport is selected by switching the four solenoids according to the instructions from microcomputer.

A 400 kHz clock forms the time reference input to the microcomputer. The stored mode is displayed by light emitting diodes (LED), while corresponding instruction signals are sent to the servo, video, audio and other circuits. The above control functions are performe by a one-chip 4-bit microcomputer with central processing unit (CPU) located in IC25.

Since the number of input signals exceeds the number of CPU input ports, IC1 is provided as an input expander. IC1 consists of four multiplexers, each of which selects one signal from among seven inputs and supplies it to the input of the CPU of IC25 in accordance with a 3-bit bus select instruction (strobe data irrelevant) from the CPU output port E. Thus, a total of 26 inputs are converted into a 4-bit output supplied to port B of IC25.

The capstan FG (25 Hz/30 Hz) and capstan stop signals are directly supplied to input port A, while decoded operation key commands are applied to ports C and D.

In a similar manner, IC18 and 19 function as output expanders for CPU IC25. These comprise four demultiplexers, each of which converts one signal from CPU output port F into seven demultiplexed outputs.

The 3-bit bus select and strobe data outputs from CPU output port E determine the signals applied to each demultiplexer. Consequently, the 4-bit output of CPU port F becomes expanded to 28 outputs.

1. Overall signal flow
   While a particular mode is in progress, the output of IC26 serial to parallel decoder is low. This is supplied via IC27 inverter to CPU input ports C and D as high potential. By this high, the CPU interprets that an operation key is not pressed. When an operation key is pressed, the encoded signal from IC1 of the operation circuit board is supplied from pin 17 via the junction circuit board to IC26.

   High and low outputs from IC26 are supplied to CPU input ports C and D. The CPU can then determine which mode key has been pressed by detecting the transmission code.

   The CPU continuously monitors the data from other input ports which indicate the states of the timer mode, cassette tape, cassette switch and other sensors. From these data, the CPU determines whether the pressed key is the same as the present mode, and whether the newly selected mode can be entered from the present mode.
   After confirming these data, the CPU generates outputs corresponding to the selected mode.

   The 4-bit output from port F is supplied to demultiplexers IC18 and 19 for expansion to 28 outputs. IC18 outputs are supplied to through inverters the drive & hold amplifier of the brake, pinch, reverse and loading tension solenoids. Each solenoid is turned on and off according to mode.

   In addition, motor forward and reverse commands are supplied from IC18 via inverter IC17 and transistors Q17 to Q32 to the reel and cassette motors. Mode control signals are sent directly from IC18 to the board.

   IC19 outputs go through open collector inverters to the operation board for lighting LEDs corresponding to the selected operation key and also directly to the servo board as the mode control signals.

3.2.3 Major circuits connected to the system control board

1. Dew sensor (condensation)
   When moisture is detected, the power LED flashes on and off at about 2 Hz, and all operations are inhibited.

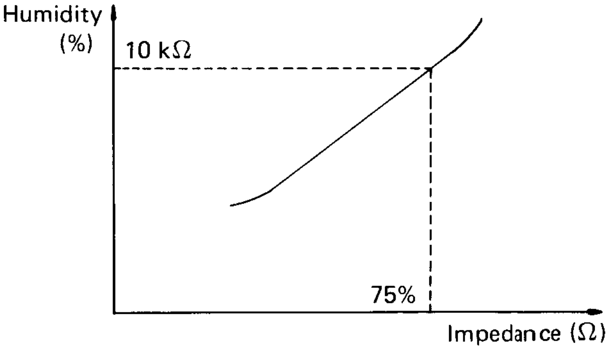


Fig. 3-1

2.	Cassette Lamp	Light source for start and end sensors
3.	End Sensor	Tape end detector
4.	Start Sensor	Tape beginning detector
5.	Cassette Switch	Detects presence of cassette
6.	AL Switch	Detects completion of loading.
7.	UL Switch	Detects completion of unloading.
8.	REC Safety Switch	Detects presence of cassette erase prevention tab.
9.	Loading Solenoid	Fixes the take-up reel during loading and unloading.
10.	Pinch Solenoid	Engages pinch roller with capstan.
11.	Reverse Solenoid	Protects tape in Reverse modes.
12.	Brake Solenoid	Fixes reels in Stop mode. (ON state release brakes)
13.	Loading Motor	Loading or unloading tape.
14.	Cassette Motor	Cassette intake and ejection.

3.2.4 IC25 CPU specifications

This forms the nucleus of the system control structure used for this model. The CPU is contained in a P channel MOS one-chip 4-bit microcomputer.

1. ROM (Read Only Memory) 200 words x 8-bit;
   The signal processing program is stored in this memory. Contents of the memory cannot be altered.
2. RAM (Random Access Memory) 96 words x 4-bit;
   This memory stores the temporary results of computation and processing.
3. I/O Port

3.2.5 Process after power on

Without cassette tape:

1. Cassette motor rotates in the eject direction for about 2.5 seconds.
2. POWER LED lights.
3. EJECT LED flashes.
4. The Stop mode is entered.

With cassette tape:

1. POWER LED lights.
2. STOP LED lights.
3. When power is turned off during Play, the Stop mode follows unloading.
4. When power is turned off during loading, the Stop mode follows unloading.

Terminals	Input/ Output	Function
INT	Input	Interrupt input: If the drum flipflop pulse ceases during the play/rec mode, low from the drum board at this input inhibits operations.
RES	Input	Reset input terminal: After power on, the microcomputer is reset by H pulse from Q33 (it is necessary to start from address 0).
$PA_{3\sim0}$	Input	Input ports $A_{3\sim0}$: 4-bit input and bit test
$PB_{3\sim0}$	Input	Input ports $B_{3\sim0}$: 4-bit input and bit test
$PC_{3\sim0}$	Input/ Output	Input/Output ports $C_{3\sim0}$: Used only for input in this model. 4-bit input and bit test.
$PD_{3\sim0}$	Input/ Output	Input/Output ports $D_{3\sim0}$: Used only for input in this model. 4-bit input and bit test.
$PE_{3\sim0}$	Output	Output ports $E_{3\sim0}$: 4-bit output and bit set/reset.
$PF_{3\sim0}$	Output	Output ports $F_{3\sim0}$: 4-bit output and bit set/reset.
$PG_{3\sim0}$	Output	Output ports $G_{3\sim0}$: 4-bit output and bit set/reset.
$PH_{3\sim0}$	Output	Output ports $H_{3\sim0}$: 4-bit output and bit set/reset.
$PI_{2\sim0}$	Output	Output ports $I_{2\sim0}$: 3-bit output and bit set/reset.
$CL_{1\sim0}$	–	For connecting an external LC resonance circuit (IFT, etc.) for internal clock oscillator: In this model, the oscillation is at 400 kHz.
TEST	Input	LSI test input terminal: This is normally connected with Vss (0 V).

Table 3-1

3.2.6 General operation

1. LEDs and control mechanisms

MODE / MAIN COMPONENTS	STOP		PLAY					REC			A. DUB			FF	REW
	Un-loading	Stop	Loading	Play	Still	Search FWD	Search REV	Loading	REC	Pause	Loading	A. Dub	Still		
POWER LED	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PLAY LED			○	○	○	○	○	○	○	○	○	○	○		
FF LED														○	
REW LED															○
REC LED								○	○	○					
A. DUB. LED											○	○	○		
PAUSE/STILL LED					○					○			○		
STOP LED	○	○													
FWD LED						○									
REV LED							○								
BRAKE SOLENOID	○		○	○	○	○	○	○	○	○	○	○	○	○	○
PINCH SOLENOID				○	○	○	○		○	○		○	○		
REV. SOLENOID							○								
LT. SOLENOID				○	○	○	○		○	○		○	○	○	○
LOADING MOTOR	○ REV		○ FWD					○ FWD			○ FWD				
REEL MOTOR (SUP.)	○ REV		○	○		○ FWD	○ REV	○	○		○	○		○ FWD	○ REV
REEL MOTOR (T.U.)				○ FWD		○ FWD	○ REV		○			○		○ FWD	○ REV
CAPSTAN MOTOR				○		○	○		○			○			
DRUM MOTOR	○		○	○	○	○	○	○	○	○	○	○	○		

○ : Lights or operates.

Table 3-2

2. Mode shift

CURRENT MODE / OPPRATION KEY	STOP		PLAY					REC			A. DUB			FF	REW
	Un-loading	Stop	Loading	Play	Still	S. FWD	S. REV	Loading	Rec	Pause	Loading	A.Dub	Pause		
STOP	╲	╲	○	○	○	○	○	○	○	○	○	○	○	○	○
PLAY	○	○	╲	╲	○	○	○	×	×	○	×	×	○	○	○
STILL/PAUSE	×	×	○ Still	○ Still	╲	○ Still	○ Still	○	○	╲	○	○	╲	×	×
FF	○	○	○	○	○	○	○	○	×	×	○	×	×	╲	○
REW	○	○	○	○	○	○	○	○	×	×	○	×	×	○	╲
PLAY+REC	○	○	○	○	○	○	○	╲	╲	╲	○	○	○	○	○
PLAY+A. DUB	○	○	○	○	○	○	○	○	○	×	╲	╲	╲	○	○
S. FWD	×	×	○	○	○	╲	○	×	×	×	×	×	×	×	×
S. REV	×	×	○	○	○	○	╲	×	×	×	×	×	×	×	×
EJECT	○	○	×	×	×	×	×	×	×	×	×	×	×	×	×
SEARCH UP	×	×	×	○	×	╲	╲	×	×	×	×	×	×	×	×
SEARCH DOWN	×	×	×	○	×	╲	╲	×	×	×	×	×	×	×	×

Table 3-3

○ : Enabled

× : Inhibited (Present mode continues.)

Note : Search Up/Down key operated only from remote. control unit.

3.2.7 Warning conditions

Tape end (Recorder model only)

- This warning operates only in the recording mode.
- 4~8 minutes before tape end in recording, the counter display flashes to indicate tape end warning.
- If recording is started while only a small amount (4 to 8 minutes) of tape remains in the cassette, the display begins to flash about 18 seconds after the start of recording.
- This function varies slightly according to the kind of cassette.

Faulty operation warning

In the following conditions, the POWER LED flashes to indicate faulty operation.

- Failure of lamp for cassette lamp. → Flashing at 1 Hz
- Drum fails to rotate. → 〃
- Unloading is not completed within about 5 seconds. → 〃
- Cassette switch is not turned off within about 0.5 seconds after start of eject operation. → 〃
- Eject is not completed within about 7 seconds. → 〃
- Faulty tape transport and absence of reel disk rotation. 〃
- Condensation detected. → 〃 2 Hz

Other warnings (Not warning)

- Loading not completed within 5 seconds. → Switch to unloading.
- Cassette housing not lowered within 5 seconds after cassette insertion. → Switch to efect mode.

3.2.8 Connection with remote control

1. When connected with 45-pin remote control unit, mainframe keys become inoperative.
2. By connecting with 7-pin remote control unit, both the mainframe and remote control unit controls are functional. Connecting the receiver for wireless remote control shorts pins 2 and 3 of the 7-pin connector.

3.2.9 Input/Output expanders

IC1, IC18 and IC19 are used to expand the input and output ports of the IC25 microcomputer. General internal construction of these ICs is shown in Fig. 3-2.

By low input to both $\overline{CE}$ (Chip Enable) and MS (Mode Select), inputs to $A_1 \sim D_7$ are routed to outputs to $H_1 \sim H_4$ (IC1 multiplexer function).

With high input at CE and MS, $H_1 \sim H_4$ are expanded and sent to outputs $A_1 \sim D_7$ (IC18 and 19 demultiplexer function). The outputs are enabled by high input to STD (strobe) and inhibited by a low input. Port E outputs of the microcomputer are distributed to IC18 and IC19, while the STD signal from CPU port 1 selects which of these ICs produce an output.

S terminals control data input and output. Binary data at S_0, S_1 and S_2 are converted to decimal by the decoder (i.e., $2^3 = 8$). This terminal then selects data from among 1 ~ 7.
Refer to Table 3-4.

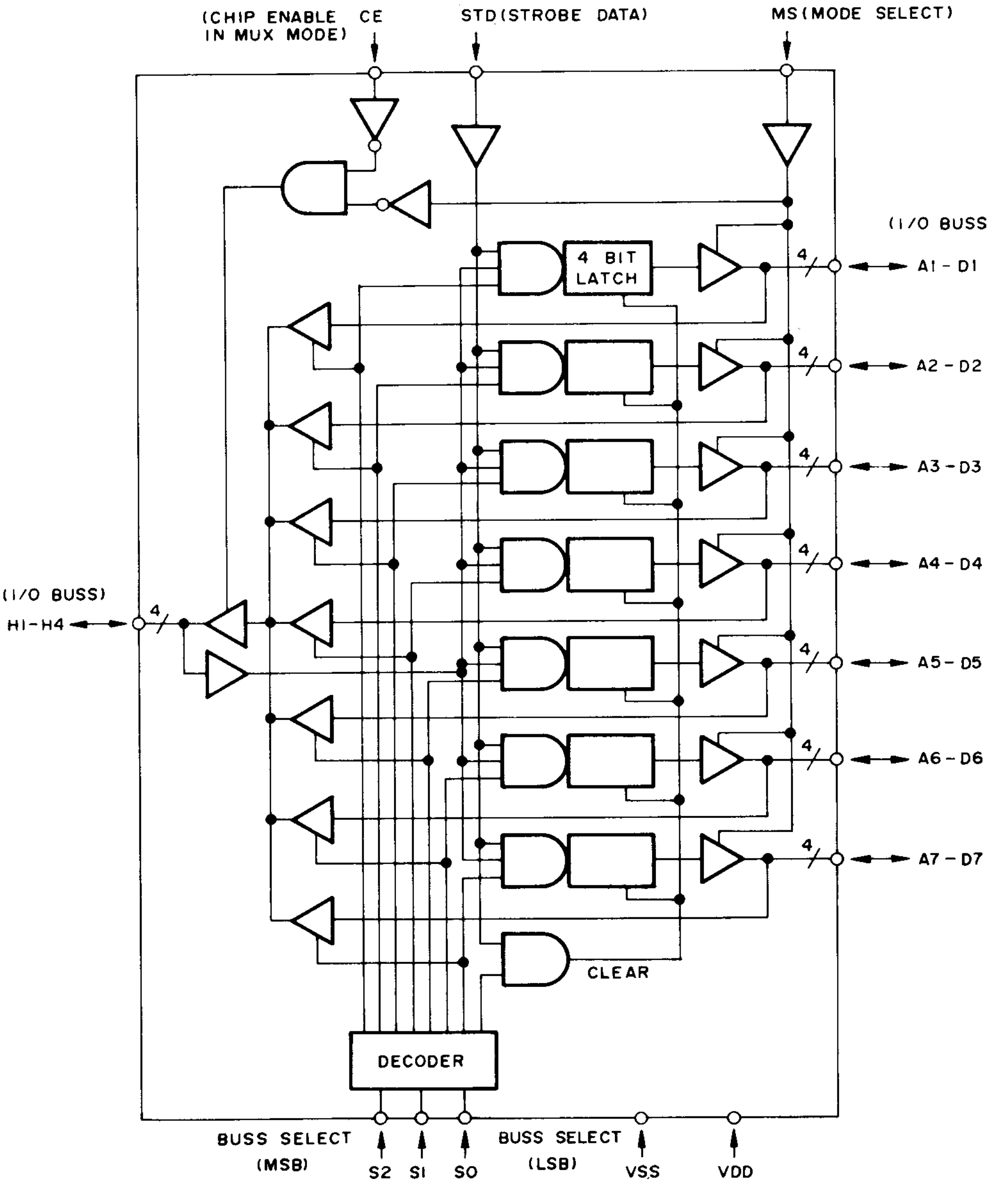

(CHIP ENABLE CE
IN MUX MODE)
STD(STROBE DATA)
MS(MODE SELECT)
(I/O BUSSES)
4 BIT
LATCH
4
A1 - D1
A2 - D2
A3 - D3
A4 - D4
A5 - D5
A6 - D6
A7 - D7
(I/O BUSS)
H1-H4
CLEAR
DECODER
BUSS SELECT
(MSB)
S2
S1
S0
BUSS SELECT
(LSB)
VSS
VDD

Fig. 3-2

I/O	S2 SI SO						
PORT	L L H	L H L	L H H	H L L	H L H	H H L	H H H
HI	AI	A2	A3	A4	A5	A6	A7
H2	BI	B2	B3	B4	B5	B6	B7
H3	CI	C2	C3	C4	C5	C6	C7
H4	DI	D2	D3	D4	D5	D6	D7

Table 3-4

For example, when control command port S_0, S_1 and S_2 are L, L and H, respectively, A_4, B_4, C_4 and O_4 become inputs or outputs to H_1, H_2, H_3 and H_4, respectively.

Expander functions

IC1 : Accepts operation commands from the mainframe or remote control unit operation keys.

IC18 : Through drive circuits, this IC controls solenoids, motors and via the mother board controls the reel servo system.

IC19 : This IC mainly controls LEDs, drum and capstan motors.

Input expander IC1

1. DEW SENSOR (condensation) . . Pin 7
   Sensor resistance increases when activated. Q4 switches ON, Q5 OFF and high level appears at pin 7. At this time, the POWER LED flashes about twice per second. When the sensor is not activated, Q4 is OFF and Q5 ON, resulting in low level at pin 7.
2. ZERO SEARCH . . . . Pin 19
   With the memory switch at the SEARCH position, pin 19 level is low. During FF and REW, when the counter indication reaches 0, the Stop mode becomes enter.
3. ASSEMBLY . . . . Pin 31
   Pressing this remote control button, sets pin 31 low to enable assembly editing. After completion of the precedingly recorded program, this assembly editing is newly enabled.
4. ZERO OUT . . . . Pin 11
   Pin 11 is high only when the counter output sets the tape counter indication to 0 to enable Counter Repeat and Zero Search (Cue).
5. CASSETTE IN . . . . Pin 15
   When cassette tape is inserted, high level appears at pin 15.
6. FORWARD (FWD) . . . . Pin 23
   Turning this remote control volume to the right sets pin 23 low level and the forward mode is entered.
7. CASSETTE LAMP . . . . Pin 8
   In event of cassette lamp failure, high from inverter IC30 appears at pin 8. All operations bocome inhibited.
8. FULL REPEAT . . . . Pin 20
   When the memory switch is set to the FULL REPEAT position, pin 20 level becomes low to enable repeat playback from tape beginning to end.
9. AUDIO INSERT . . . . Pin 32
   Pressing this remote control key sets pin 32 low, at which time CH-1 andCH-2 control priority shifts to the remote control unit. If the CH-1 and CH-2 keys are pressed simultaneously CH-1 has priority.
10. TIME OUT (Long Still) . . . . Pin 12
    When the STILL MODE is selected, about after 2 minutes and 30 seconds, pin 12 goes low and STILL MODE is maintained.
11. CASSETTE SWITCH . . . . Pin 16
    If cassette switch is not off high at, pin 16 inhibits operation.
12. REVERSE . . . . Pin 24
    Turning this remote control volume to the left sets pin 24 low to shift to the reverse mode.
13. EDIT START . . . . Pin 27
    Low appears at pin 24 when this remote control key is pressed and editing starts at the editing point after preroll.
14. EDIT STOP . . . . Pin 28
    Pressing this remote control key sets pin 28 low and stops editing. At this time, the recorder unit is set to the play mode.
15. PREROLL TIME . . . . Pin 10
    PAL . . . . Pin 9
    These set the amount of preroll for joining recorded segments and switch between PAL and NTSC systems.
16. COUNTER REPEAT . . . . Pin 21
    Setting the memory switch to the COUNTER REPEAT position produces low at pin 21 and enables repeat playback from counter indication 0 to the tape end.

17. REVIEW . . . . Pin 33
When this remote control key is pressed, low appears at pin 33 and rehearsal editing is enabled.

18. END SENSOR . . . . Pin 13
Pin 13 is high while opaque video tape remains. At the transparent trailer tape (tape end), low at this pin switches the mode to Auto Rew (PLAY/REC, AUD · DUB, FF). If SEARCH FWD is in progress, the Still mode becomes entered after brief rewind.

19. UNLOADING SW . . . . Pin 17
During unloading, pin 17 is high level and becomes low completion of unloading.

20. TIMER REC . . . . Pin 25
TIMER PLAY . . . . Pin 26
Timer recording and timer playback can be performed by connecting an accessory timer. In this machine, both fixed at high level.

21. COUNTER REPEAT-2 . . . . Pin 22
When the memory switch is set to the COUNTER REPEAT position, low appears at pin 22 and repeat playback from tape start to counter 0 is enabled.

22. REC SAFETY . . . . Pin 34
When REC SAFETY switch is ON (cassette erase preventing tab present) low at pin 34 enables recording. In absence of the cassette erase preventing tab, the setting pin 34 high to inhibit recording. At this time, simultaneously pressing the REC + PLAY or DUB + PLAY keys yields the Play mode.

23. START SENSOR . . . . Pin 14
While the opaque video tape is present, pin 14 is high level. This becomes low at the transparent leader tape (tape start) and switches the mode to AUTO STOP. If SEARCH REV is in progress, the mode turns to STILL after brief winding operation.

24. AFTER LOADING SW (AL SW) . Pin 18
Pin 18 is high during loading and becomes low after completion of loading.

- IC18 output port and expander signals and functions

CPU OUTPUT PORT IC-25		OUTPUT EXPANDER IC 18	DETECTIVE SIGNAL (SENSOR NAME)	IC 13	CONDITION	STOP		PLAY					REC			AUD'DUB				
						Un loading	Stop	Loading	Play	STiil	Search FWD	Search REV	Loading	Rec	Pause	Loading	Aud. dub	Pause	FF	Rew
PORT-F IC25	1	A1	Supply Tension Compensate	7 (PIN)	H:Tape engaged with drum (Al sw on)	L	L	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ	L	Ⓗ	Ⓗ	L	Ⓗ	Ⓗ	L	L
		B1	Reel Loading	8	H:Tape loading	L	L	Ⓗ	L	L	L	L	Ⓗ	L	L	Ⓗ	L	L	L	L
		C1	Reel Rew	9	H'Rew mode	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Ⓗ
		D1	Reel FF	10	H:FF mode	L	L	L	L	L	L	L	L	L	L	L	L	L	Ⓗ	L
	2	A2																		
		B2																		
		C2	Loading Tension Solenoid-1	21	H:Hold solenoid	L	L	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ	L	Ⓗ	Ⓗ	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ
		D2	Loading Tension Solenoid-2	22	H:Drive solenoid	L	L	L	(⎍)	L	L	L	L	(⎍)	L	L	(⎍)	L	(⎍)	(⎍)
	3	A3	Cassette Motor-1	31	H:Cassette insert	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		B3	Cassette Motor-2	32	H:Cassette insert	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		C3	Cassete Motor-0	33	H:Cassete eject	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		D3																		
	4	A4	Reel Still	11	H:Stiil pause mode	L	L	L	L	Ⓗ	L	L	L	L	Ⓗ	L	L	Ⓗ	L	L
		B4	Reel Unloading	12	H:Tape unloading	Ⓗ	L	⎍	L	L	L	L	⎍	L	L	⎍	L	L	L	L
		C4	Take-Up Tension Conpensate	13	H:Rec, play mode	L	L	L	Ⓗ	L	L	L	L	Ⓗ	L	L	Ⓗ	L	L	L
		D4	Reel Stop	14	H:Stop mode	L	Ⓗ	L	L	L	L	L	L	L	L	L	L	L	L	L
	5	A5	Capstan Search	15	H:Search, still pause mode	⎍	L	L	L	Ⓗ	Ⓗ	Ⓗ	L	L	Ⓗ	L	L	Ⓗ	L	L
		B5	Long Still	16	H:Still > + 150sec	L	L	L	L	Ⓗ	L	L	L	L	Ⓗ	L	L	L	L	L
		C5	Capstan Reverse	17	H:Still, rew, pausee mode	L	L	L	L	Ⓗ	L	Ⓗ	L	L	Ⓗ	L	L	Ⓗ	L	L
		D5																		
	6	A6	Pinch Solenoid -1	23	H:Hold solenoid	L	L	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ	L	Ⓗ	Ⓗ	L	Ⓗ	Ⓗ	L	L
		B6	Pnch Solenoid-2	24	H:Drive solenoid	L	L	L	(⎍)	L	L	L	L	(⎍)	L	L	(⎍)	L	L	L
		C6	Reverse Solenoid-2	25	H:Hold solenoid	L	L	L	L	L	L	Ⓗ	L	L	L	L	L	L	L	L
		D6	Reverse Solenoid-2	26	H:Driv solenoid	L	L	L	L	L	L	(⎍)	L	L	L	L	L	L	L	L
	7	A7	Loading Motor	27	H:Tape loading	L	L	Ⓗ	L	L	L	L	Ⓗ	L	L	Ⓗ	L	L	L	L
		B7	Unloding Motor	28	H:Tape unloading	Ⓗ	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		C7	Brake Solenoid-1	29	H:Hold solenoid	Ⓗ	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ
		D7	Brake Solenoid-2	30	H:Drive solenoid	Ⓗ	L	Ⓗ	(⎍)	L	L	L	Ⓗ	(⎍)	L	Ⓗ	(⎍)	L	Ⓗ	Ⓗ
			Video Playback IC25-30		H:During video playback	L	L	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ	L	L	L	L	Ⓗ	Ⓗ	L	L
			Video Recording31 IC 25-31		H:During video rec	L	L	L	L	L	L	L	L	Ⓗ	L	L	L	L	L	L

Table 3-5 Output Port signals vs Modes

Symbols
H : High output
L : Low output
⎍: High pulse output

- IC19 output port and expander signals and functions

OUTPUT CPU OUTPUT PORT (IC-25)		EXPANDER IC19	DETECTIVE SIGNAL (Sensor name)	IC 19	CONDITION	INPUT PORT CONDITION														
						STOP		PLAY					RECORD			AUD. DUB				
						Un loading	Stop	Loading	Play	Still	Search FWD	Search REV	Loading	REC	PAUSE	Loading	A. Dub	Pause	FF	REW
PORT-F IC-25	1	A1	STILL LED	7 (PIN)	H : Still LED	⎍	L	L	L	Ⓗ	L	⎍	L	L	Ⓗ	L	L	Ⓗ	L	L
		B1	SEARCH LED	8	H : Search LED on frow remote	L	L	L	L	Ⓗ	Ⓗ	Ⓗ	L	L	L	L	L	L	L	L
		C1	SEARCH-FWD. LED	9	H : Search forward	L	L	L	L	L	Ⓗ	L	L	L	L	L	L	L	L	L
		D1	SEARCH-REV. LED	10	H : Search reverse	L	L	L	L	L	L	Ⓗ	L	L	L	L	L	L	L	L
	2	A2	POWER LED	19	H : Power LED on	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		B2	FLICKER	20	H : Flashing LED on	Ⓗ	L	Ⓗ	L	L	L	L	Ⓗ	L	L	Ⓗ	L	L	L	L
		C2	DOWN	21	H : Tape reverse, Tape loading	L	L	Ⓗ	L	L	L	Ⓗ	Ⓗ	L	Ⓗ	Ⓗ	L	L	L	Ⓗ
		D2																		
	3	A3	REC	31	H : REC Mode	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L
		B3	DRUM MOTOR	32	H : Drum rotation	Ⓗ	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	L	L
		C3	DRUM SEARCH	33	H : Drum freerun	L	L	L	L	Ⓗ	Ⓗ	Ⓗ	L	L	L	L	L	Ⓗ	L	L
		D3																		
	4	A4	STOP LED	11	H : Stop LED on	Ⓗ	Ⓗ	L	L	L	L	L	L	L	L	L	L	L	L	L
		B4	FF LED	12	H : FF LED on	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L
		C4	REW LED	13	H : REW LED on	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H
		D4	PLAY LED	14	H : Play LED on	L	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	Ⓗ	L	L
	5	A5	EDIT LED	15	H : Edit LED on from remote	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		B5	REC LED	16	H : Rec LED on	L	L	L	L	L	L	L	Ⓗ	Ⓗ	Ⓗ	L	L	L	L	L
		C5	AUDIO-PUB LED	17	H : Audio dub LED on	L	L	L	L	L	L	L	L	L	L	Ⓗ	Ⓗ	Ⓗ	L	L
		D5	EJECT LED	18	H : Eject LED on	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	6	A6	SPEED UP	23	H : Forward SW on from remote	L	L	L	L	L	Ⓗ	L	L	L	L	L	L	L	L	L
		B6	SPEED DOWN	24	H : Reverse SW on from remote	L	L	L	L	L	L	Ⓗ	L	L	L	L	L	L	L	L
		C6																		
		D6																		
	7	A7	X10 SPEED	27	H : Search mode	L	L	L	L	⎍	Ⓗ	Ⓗ	L	L	L	L	L	⎍	L	L
		B7	X2 SPEED	28	H : Preroll	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		C7	X1/5 SPEED	29	H : Preroll	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
		D7	CAPSTAN MOTOR	30	H : Rotation	L	L	L	Ⓗ	L	Ⓗ	Ⓗ	L	Ⓗ	L	L	Ⓗ	L	L	L
	PORT-H		AUDIO E-E IC25–26		H : During and EE	Ⓗ	Ⓗ	Ⓗ	L	L	L	L	Ⓗ	Ⓗ	Ⓗ	Ⓗ	L	L	Ⓗ	Ⓗ
			AUDIO REC IC25–27		H : During and REC	L	L	L	L	L	L	L	L	Ⓗ	L	L	Ⓗ	Ⓗ	L	L
			AUDIO PLAYBACK E-E IC25–29		H : During and playback EE	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L

Table 3-6 Output Port signals vs Modes

Symbols
H : High output
L : Low output
⎍ : High pulse output

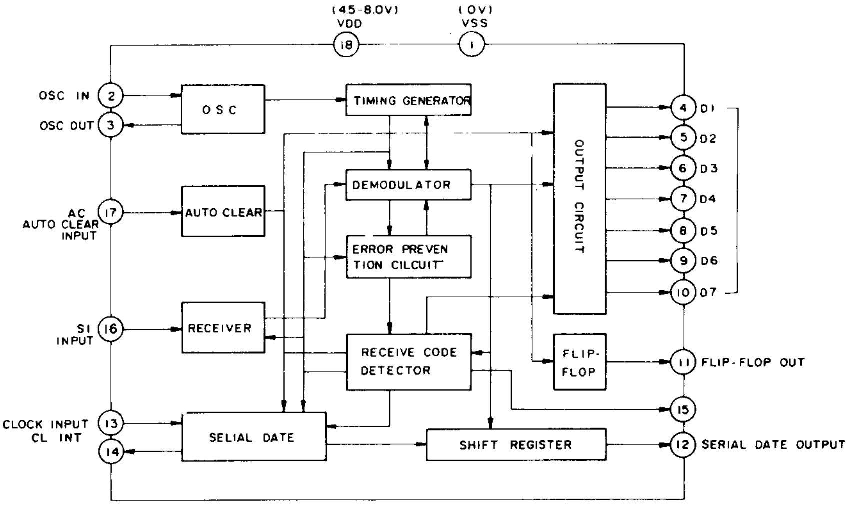
3.2.10 Serial to parallel decoder circuit

IC26 (M50117AP) and Peripheral circuit

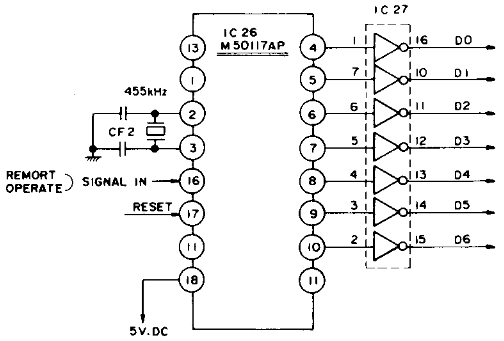
- The 10-bit transmission code output from operation board IC1 pin 17 is supplied in the route: Syscon board P320 pin 1 → P316 pin 6 → Junction board P335 pin 6 → Junction board IC8 → IC3 → IC6 → Junction board P335 pin 9 → Syscon board P316 pin 9 → gate circuit → IC26 pin 16.
- Internally, IC26 consists of oscillator, timing oscillator, demodulator, error prevention, receiving mode detector, serial data processor, shift register, receiving signal input and auto clear circuits. Operation and remote control key signals are identical and 7-bit parallel data are supplied to the CPU.
- Oscillator
IC26 includes a built-in CMOS inverter and high bias resistance. The oscillator consists of a ceramic resonator and two capacitors. Its resonating frequency is 455 kHz.
- Receiving signal input and Demodulation circuits
The transmitted 10-bit serial data are applied to the $\overline{SI}$ input at IC26 pin 16. These are processed by the input circuit and sent to the demodulation circuit.

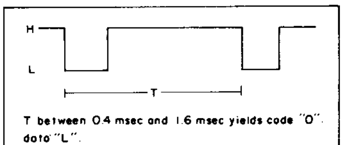
  In the demodulation circuit, the pulse signal is judged by its interval and the signal is coded in digital form. The relation among the pin 16 input waveform, code and data is shown in Fig. 3-3.

  A pulse interval longer than 3.2 msec is interpreted as completion of one word. If the interval exceeds an additional 50 msec, end of command transmission becomes interpreted and the outputs are set to stand-by.


(4.5-8.0V)
VDD
18
(0V)
VSS
1
OSC IN 2
OSC OUT 3
OSC
TIMING GENERATOR
DEMODULATOR
ERROR PREVEN TION CILCUIT
AC AUTO CLEAR INPUT 17
AUTO CLEAR
SI INPUT 16
RECEIVER
RECEIVE CODE DETECTOR
FLIP-FLOP
CLOCK INPUT 13
CL INT 14
SELIAL DATE
SHIFT REGISTER
OUTPUT CIRCUIT
4 D1
5 D2
6 D3
7 D4
8 D5
9 D6
10 D7
11 FLIP-FLOP OUT
15
12 SERIAL DATE OUTPUT

OPERATION KEY	KEY CODE			TRANSMISSION CODE						
	K0	K1	K2	D0	D1	D2	D3	D4	D5	D6
STOP SW	1	0	0	1	1	0	0	0	0	0
PLAY SW	1	0	0	0	0	1	1	0	0	0
PLAY+REC SW	1	0	0	0	0	1	1	0	1	1
PLAY+A.DUB SW	1	0	0	0	0	1	1	0	1	0
SEARCH FWD SW	1	0	0	0	1	1	1	0	0	0
SEARCH REV SW	1	0	0	1	1	1	1	0	0	0
FF SW	1	0	0	0	1	1	0	0	0	0
REW SW	1	0	0	1	1	1	0	0	0	0
STILL SW	1	0	0	1	0	1	1	0	0	0
REC E E	1	0	0	0	0	1	1	0	0	1
SPEED UP	1	0	0	0	0	1	0	1	0	0
SPEED DOWN	1	0	0	1	0	1	0	1	0	0


IC 26
M50117AP
IC 27
455kHz
CF2
REMORT OPERATE
SIGNAL IN
RESET
5V.DC
13
1
2
3
16
17
11
18
4
5
6
7
8
9
10
11
1
7
6
5
4
3
2
16 D0
10 D1
11 D2
12 D3
13 D4
14 D5
15 D6



T between 0.4 msec and 1.6 msec yields code "0".
data "L".
T between 1.6 msec and 3.2 msec yields code "1".
data "H".

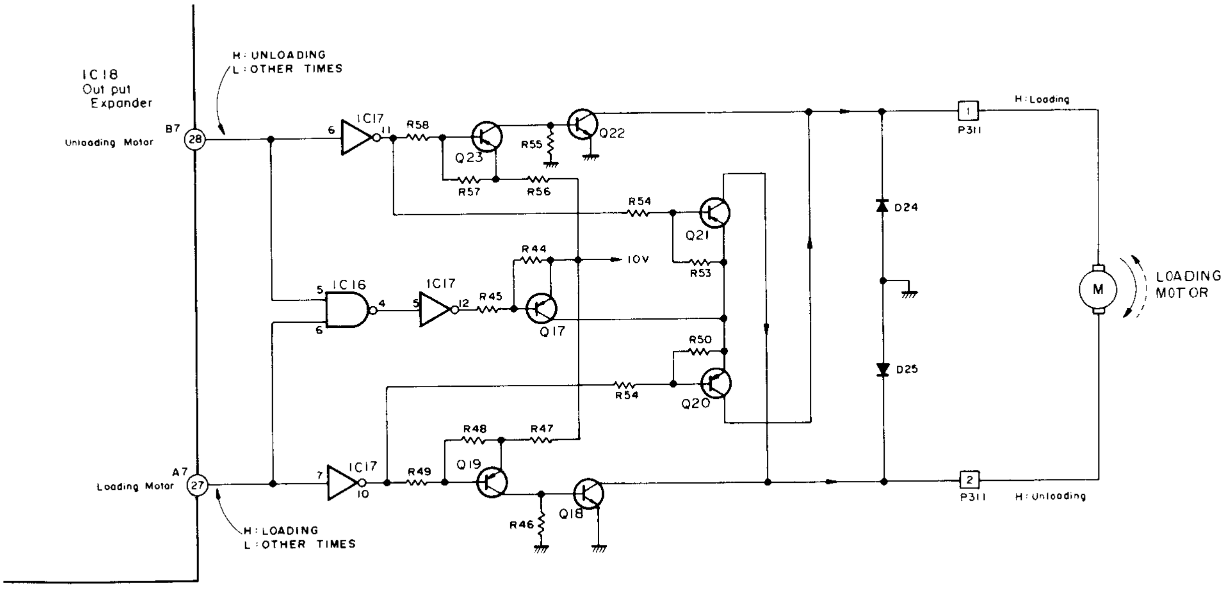
Fig. 3-3

- Error prevention
  A low signal at pin 16 for less than 50 to 100 μsec is not accepted as a transmission signal. Also, a pulse interval T shorter than 0.4 msec produces reset to stand-by. The stand-by state is also entered if the input code is all zeros or all ones.
- Receiving code, Data and Flipflop outputs
  Data outputs D_0 ~ D_6 correspond to the transmission codes D_0 ~ D_6. If the code is zero, the data output is L and if the code is one, the data output is H. Flipflop output FF becomes H if the transmission code D_0 ~ D_6 is 1010000 and L if D_0 ~ D_6 is 0100000.

3.2.11 Tape loading motor drive circuit

Functions

1. Change the direction of motor rotation by switching the motor current polarity between loading and unloading. In Fig. 3-4.
2. Stop motor rotation at the completion of loading and unloading.
   Play button . . . . loading start
   Stop button . . . . unloading start
3. IC16 is used for error protection. High command for unloading or loading switches Q17 off and cuts off B power supply.
4. Loading motor drive circuit operation



IC18
Out put
Expander
B7
Unloading Motor
28
H: UNLOADING
L: OTHER TIMES
IC17
6
11
R58
Q23
R55
Q22
R57
R56
R54
Q21
R44
10V
R53
5
IC16
6
4
IC17
5
12
R45
Q17
R50
R54
Q20
R48
R47
A7
Loading Motor
27
IC17
7
10
R49
Q19
Q18
R46
H: LOADING
L: OTHER TIMES
D24
D25
1
P311
H: Loading
2
P311
H: Unloading
M
LOADING
MOTOR

Fig. 3-4

STATE MODE	IC16- 4 PIN	IC17- 12 PIN	Q17	IC17- 10 PIN	Q20	Q19	Q18	IC17- 11 PIN	Q21	Q23	Q22	MOTOR ROTATION
LOADING	High	Low	ON	Low	ON	ON	ON					→ FORWARD
LOADING COMPLETION	High	Low	ON	High	OFF	OFF	OFF					STOP
UNLOADING	High	Low	ON					Low	ON	ON	ON	← REVERSE
UNLOADING COMPLETION	High	Low	ON					High	OFF	OFF	OFF	STOP

Table 3-7

3.2.12 Tape remaining sensor

During recording, if the tape remaining becomes less than five minutes, the counter indicator at the left side of the front panel flashes.
This function is controlled by microcomputer IC14 of the system control board.
Fig. 3-5 shows the microcomputer I/O.

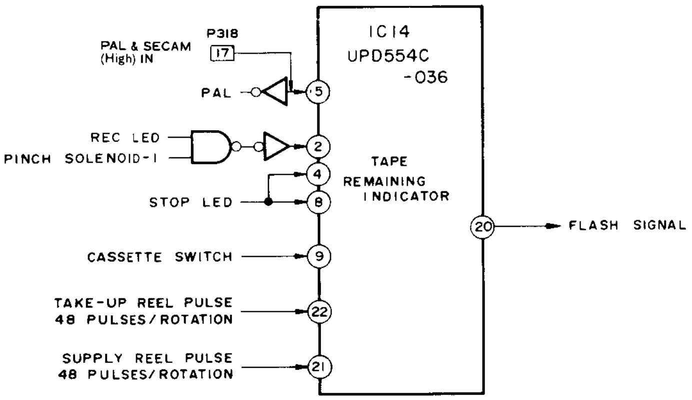

PAL & SECAM (High) IN
P318
17
PAL
5
REC LED
PINCH SOLENOID-1
2
4
STOP LED
8
CASSETTE SWITCH
9
TAKE-UP REEL PULSE 48 PULSES/ROTATION
22
SUPPLY REEL PULSE 48 PULSES/ROTATION
21
IC14
UPD554C
-036
TAPE REMAINING INDICATOR
20
FLASH SIGNAL

Fig. 3-5

As indicated in the figure, I/O signals consist of REC LED, pinch solenoid-1, stop LED, cassette switch and PAL. The take-up and supply reel FG count signals are supplied as operation sensing signals.
Tape remaining length is determined by measuring the rotation time of the take-up and supply reel disks.

Each reel disk is notched with 48 teeth as shown in Fig. 3-6. As the disks rotate, the microcomputer measures the time required to obtain 48 pulses from each reel.

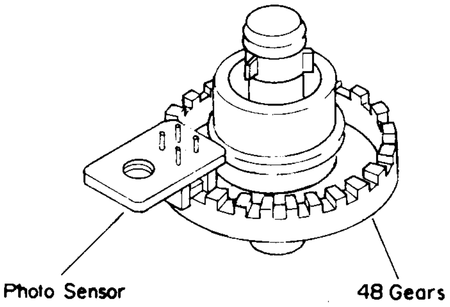


Photo Sensor
48 Gears

Fig. 3-6

Total length of the cassette tape is computed from the size of the reel hubs obtained by adding the times for both reel disks, as shown in Fig. 3-7. Tape remaining is then computed by measuring the time for supply reel rotation.

The criterion for determining total tape length is based on whether the combined time required for both reels to turn once is greater or less than 17.2 seconds.

For example, in the recording mode using E-180 tape, one revolution of the take-up reel takes about 3.7 seconds (point X) for the early portion of the tape because of the small winding radius. For the supply reel, one revolution takes about 11 seconds (point Y) because of the larger radius.

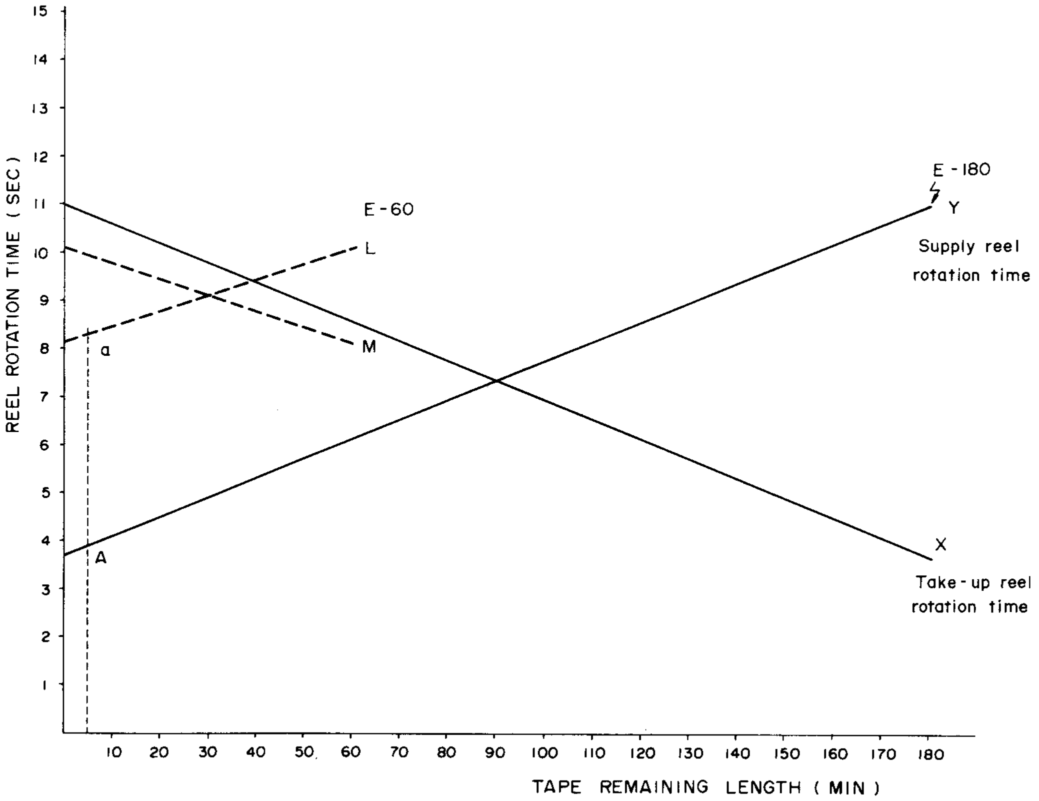


Fig. 3-7

The sum of the two reel disk rotations becomes approximately 14.7 seconds. Since this is smaller than 17.2 seconds, the microcomputer recognizes the length of E-180

In the same manner, for E-60 tape, one revolution of the take-up reel takes about 8.1 seconds (point M) in the early portion recording, while the supply reel requires about 10.1 seconds (point L).

The sum of the two rotations in this case becomes about 18.2 seconds. As this is greater than 17.2 seconds, the microcomputer recognizes a E-60 cassette.

Fig. 3-8 shows the flow chart.

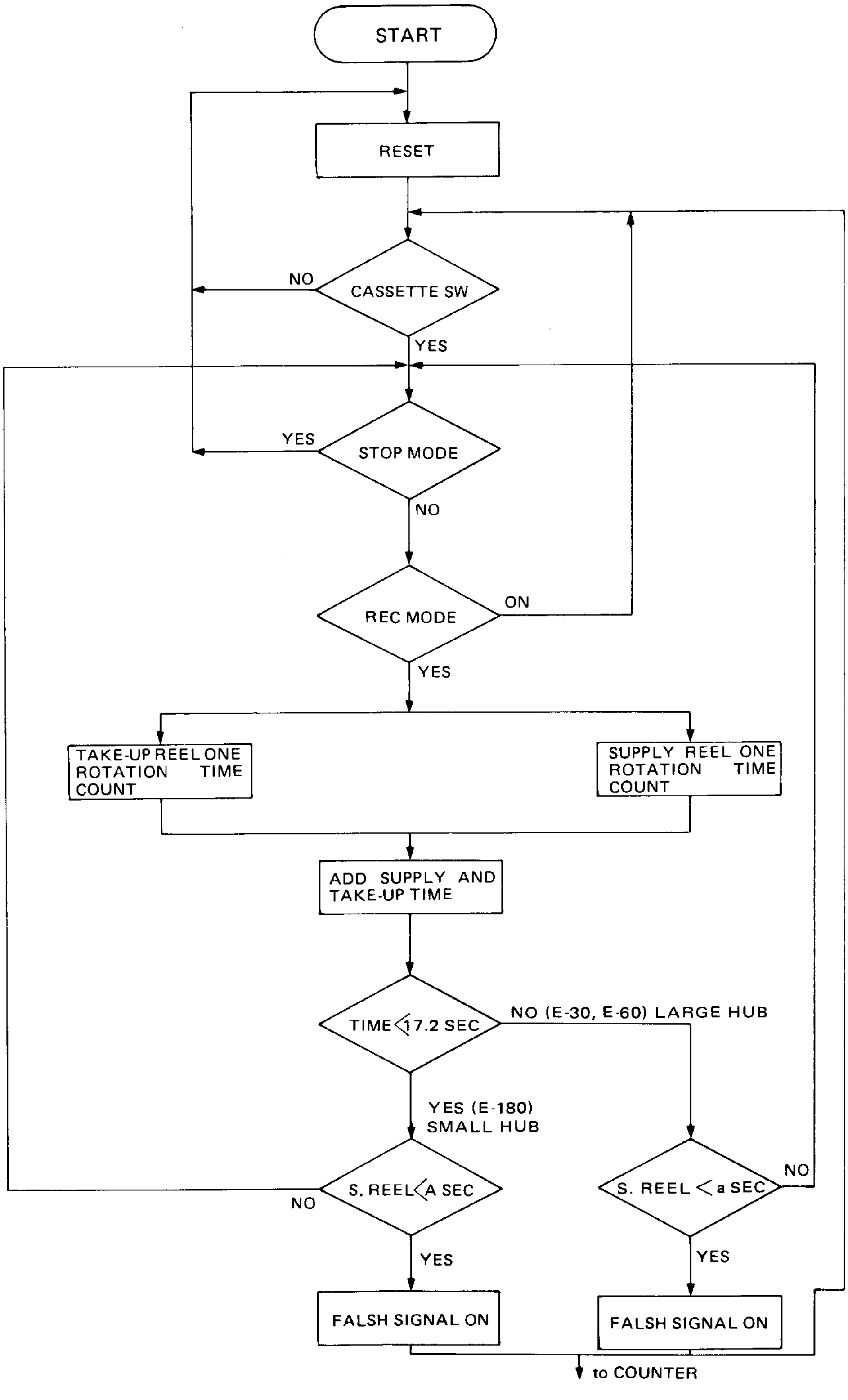

START
RESET
NO
CASSETTE SW
YES
YES
STOP MODE
NO
REC MODE
ON
YES
TAKE-UP REEL ONE ROTATION TIME COUNT
SUPPLY REEL ONE ROTATION TIME COUNT
ADD SUPPLY AND TAKE-UP TIME
TIME<17.2 SEC
NO (E-30, E-60) LARGE HUB
YES (E-180) SMALL HUB
S. REEL<A SEC
NO
S. REEL <a SEC
NO
YES
YES
FALSH SIGNAL ON
FALSH SIGNAL ON
to COUNTER

Fig. 3-8 Flowchart for tape remaining indicator

3.2.13 Search speed control circuit

IC29 controls the tape speed (rotation of capstan motor) for the search speed mode in response to up and down command.

Continuously variable speed from still to X5 in the search mode is obtained by varying the signal voltage linearly from 2.7 V to 9.6 V. When the X5 speed is exceeded (over 9.6 V), a fixed voltage becomes switched in to set the X10 speed.

1. Speed up Command
   At the command signal from the remote control unit, high from pin 23 through IC11 open collector inverter switches Q8 on. This charge is started by C9 through D3 and R28. The variable stored voltage is supplied to the non-invert pin 3 of operational amplifier IC2 and the output voltage from pin 1 varies linearly with respect to input variable voltage. The block diagram is shown in Fig. 3-15. When this input voltage is varied, it is applied, from IC29 pin 7 to the invert input of op-amp A and the non-invert input of op-amp B. The input voltage increases to the extent the FWD key is held depressed.

   Op-amp A output remains saturated while the input voltage is low decreases as the input voltage increases. Op-amp B possesses the opposite characteristics, as indicated in Fig. 3-9. The anodes of diodes DA and DB are connected. Of these the diode at the op-amp (A or B) which has the lower output voltage switches on. Consequently, the anode output voltage of DA and DB becomes an inverted V characteristic as depicted in Fig. 3-10.

   This is supplied to the invert inputs of op-amps (E and F) as the search speed output voltage.

Gain of op-amp E is less than op-amp F and is adjustable with external R24. The output vs. input characteristic of op-amps E and F is shown in Fig. 3-11. The higher output voltage of op-amp E or F goes through diodes DE and DF to become as shown in Fig. 3-12.

The input indicated in Fig. 3-10 yields the output curve of Fig. 3-13.

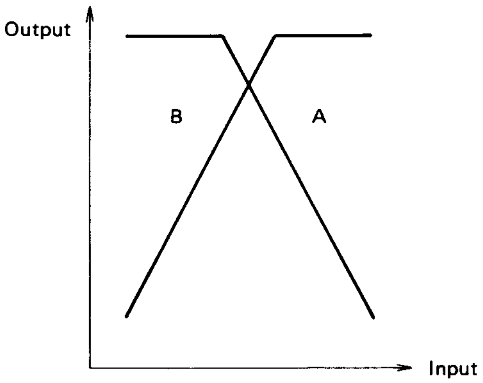


Fig. 3-9 Input and output of A and B

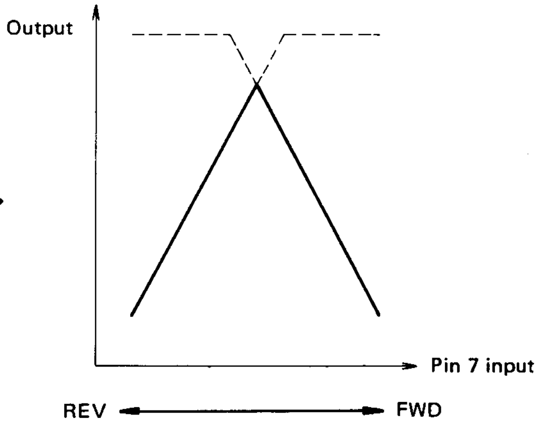


Fig. 3-10 Output of diodes DA and DB

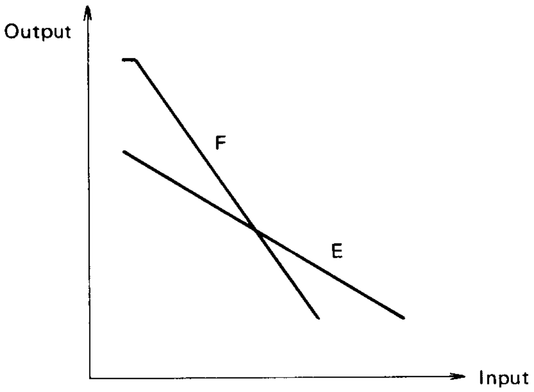


Fig. 3-11 Output vs. input of op-amps E and F

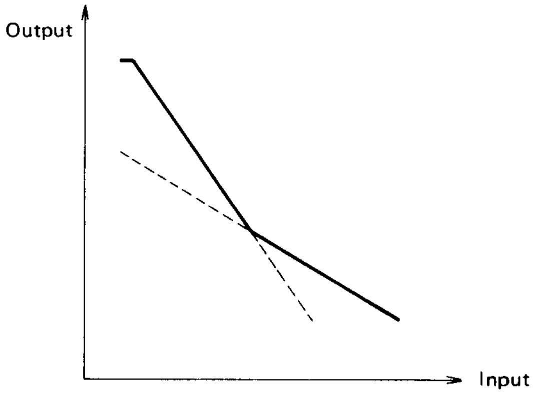


Fig. 3-12 Output of diodes DE and DF

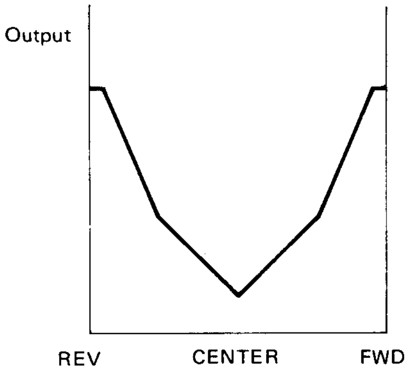


Fig. 3-13

The search speed output voltage from IC29 pin 3 is supplied to the non-invert input (pin 5) of system control board IC2 and pin 3 of analogue switch IC7 via IC2 and the 7-pin connector of the junction board (pin 2 and 3 are shorted by the light sensor). High at pin 5 switches IC7 on to supply search speed voltage 0 to X5) to the capstan servo.

The non-invert input (pin 6) of IC2 is set to maximum voltage (about 9.6 V) by variable resistors R124, R125, and R21.
To produce the fixed X10 speed, IC2 pin 7 changes from low to high with a 9.6 V invert input at pin 5.

Low appears at pin 5 of IC7 through D8, D21, and open collector inverter IC11, switching off the output voltage of IC2 pin 7. High at pin 13 switches IC7 on, and fixed voltage divided by R66 and R67 is supplied to the capstan servo as the X10 search speed voltage.

2. Speed Down Mode
   Command signal from syscon produced high from IC29 pin 24 which switches on diodes D5 and D6 and discharges C9 through open collector inverter IC11. Afterwards the process is the opposite of the Speed Up mode.

3. Forward and Reverse Commands
   The outputs of op-amps A and B are supplied to the inverting inputs of voltage comparators C and D. These voltages are compared with the reference voltage Vf set by R23 conneeted to the noninvert input. The resulting voltage goes to IC1 expander through open collector inverter IC10. Fig. 3-14 shows this operation.

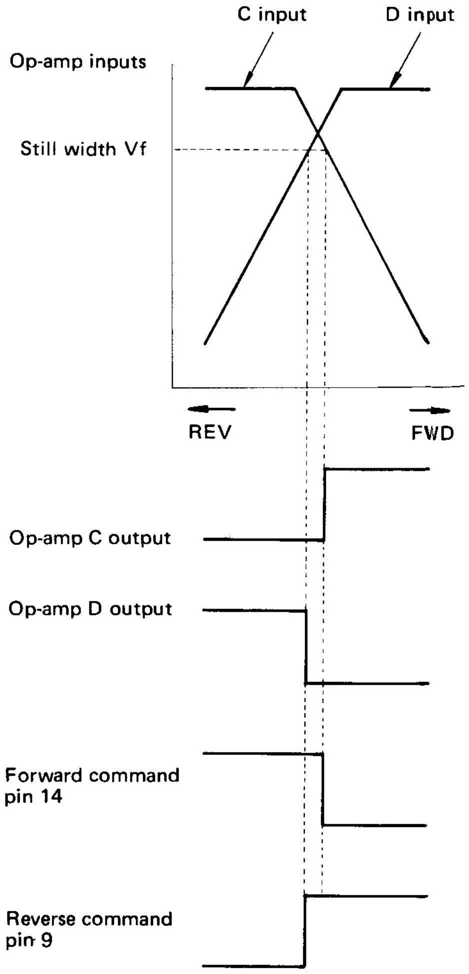


Fig. 3-14

4. Other Circuits

During the Stop mode, pin 4 of IC9 is high and IC7 turns on, R22 adjusts for minimum search output voltage.

R24 adjusts for 2.7 ± 0.05 V at this time output voltage. If the 7-pin remote controller is connected and the search mode selected, the inputs (pins 5 and 6) of IC9 becomes high and IC17 switches off to shift priority the speed up/down command.

When the 45-pin remote controller is connected, IC7 switches on and discharges through open collector inverter IC32 and IC9. Forward and reverse commands from IC29 do not function since diodes D26 and D27 switch on through open collector inverter IC10.

3.2.14 Cassette motor drive circuit

This model is a front loading type which features motorized insertion and ejection of the cassette. Presence of a cassette is detected by an LED and photo interrrupter system.

1. Description of IC3 (HA17555PS)

   The HA17555PS is an IC which is capable of accurate time delay or oscillation.

   In these modes, the output pulse width is determined by either an external resistance or a capacitance respectively.

- Fig. 3-16 shows a monostable circuit using the HA17555PS. Assure that external capaciter C is discharged initially by transistor Q2 within the IC. A negative input pulse applied to the trigger terminal sets the flipflop and switches Q2 off, yielding a high level output. Capacitor C9 is charge through R13 with the time constant determined by T = R13 x C9. When the voltage between the terminals of capacitor C reaches the threshold voltage of comparator A, the flipflop is reset, Q2 turns on and capacitor C discharges. This returns the output to low level. During this interval, again applying the pulse input will not retrigger the monostable.

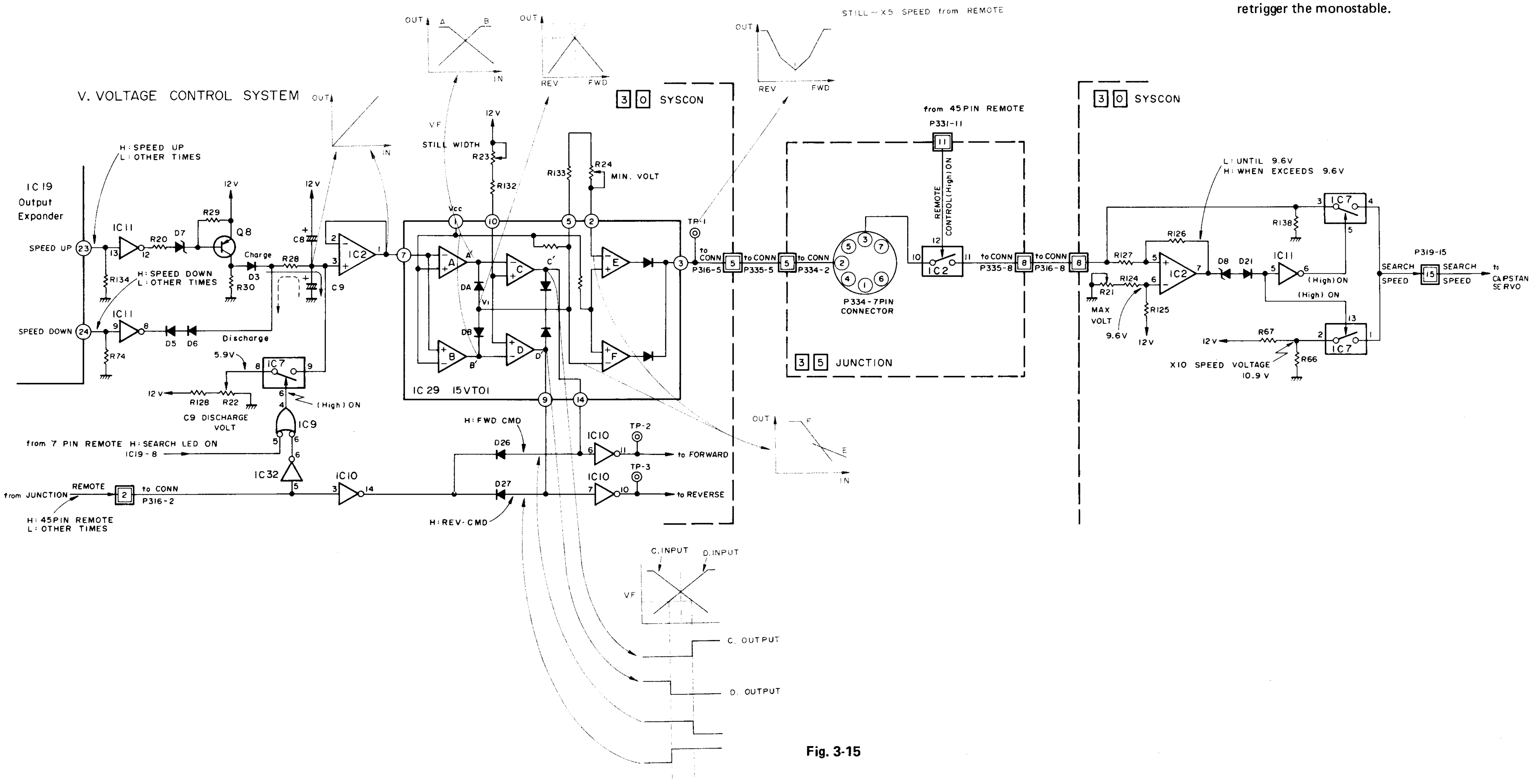

V. VOLTAGE CONTROL SYSTEM
IC19 Output Expander
SPEED UP 23
SPEED DOWN 24
H: SPEED UP
L: OTHER TIMES
H: SPEED DOWN
L: OTHER TIMES
IC11
R20
D7
R29
Q8
12V
Charge
R28
D3
R30
C8
C9
IC2
R134
R74
D5 D6
Discharge
5.9V
IC7
(High) ON
12V
R128 R22
C9 DISCHARGE VOLT
IC9
from 7 PIN REMOTE H: SEARCH LED ON
IC19-8
IC32
IC10
REMOTE
from JUNCTION
to CONN P316-2
H: 45PIN REMOTE
L: OTHER TIMES
OUT
IN
REV
FWD
VF
STILL WIDTH
R23
R132
R133
R24
MIN. VOLT
Vcc
IC29 15VT01
DA
DB
H: FWD CMD
H: REV-CMD
D26
D27
TP-1
TP-2
TP-3
to FORWARD
to REVERSE
3 0 SYSCON
to CONN P316-5
to CONN P335-5
to CONN P334-2
STILL→X5 SPEED from REMOTE
from 45PIN REMOTE P331-11
REMOTE CONTROL (High) ON
P334-7PIN CONNECTOR
to CONN P335-8
to CONN P316-8
3 5 JUNCTION
C. INPUT
D. INPUT
C. OUTPUT
D. OUTPUT
L: UNTIL 9.6V
H: WHEN EXCEEDS 9.6V
R138
R126
R127
R124
R21
MAX VOLT
9.6V
R125
D8 D21
(High) ON
R67
R66
X10 SPEED VOLTAGE 10.9 V
P319-15
SEARCH SPEED
to CAPSTAN SERVO

Fig. 3-15

- Reference Voltage Circuit
  Equal resistances divide the power supply voltage into three lines. 2/3 VCC is connected to comparator A and 1/3 VCC to comparator B. 2/3 VCC terminal is also routed externally as the control voltage. Threshold and trigger levels can be changed by applying external bias.
- Comparator A
  Comparator A is connected to the 2/3 VCC reference voltage and switches when the threshold voltage exceeds 2/3 VCC, resetting the flipflop.
- Comparator B
  Comparator B is connected to the 3/1 VCC reference voltage and switches when the trigger voltage exceeds 1/3 VCC, setting the flipflop.
- Flipflop
  This is an RS flipflop conposed of transistors and resistors. It is stabilized in the reset mode by the reset signal from comparator A and in the set mode by the set signal from comparator B.
- Output Circuit
  The output level is high or low depending on the output status of the flipflop circuit.
- Reset
  Low at the reset terminal yields a low output to begin a new cycle. This function has priority over other inputs.
- Discharge
  Q2 switches on/off to charge or discharge the timing circuit connected to the terminals.

2. Cassette Loading Circuit
   When a cassette is inserted, high output from the photo interrupter goes via connectors P317 pin 5 and P325 pin 9 to pin 4 of the system control sub-board. This high output is then supplied to a Schmitt circuit at IC1 pin 13.
   Low output from IC1 pin 12 is supplied to IC2 pin 12 and high appears at IC2 pin 11. This high output goes to pin 15 of IC1 (input expander) of the system control board.

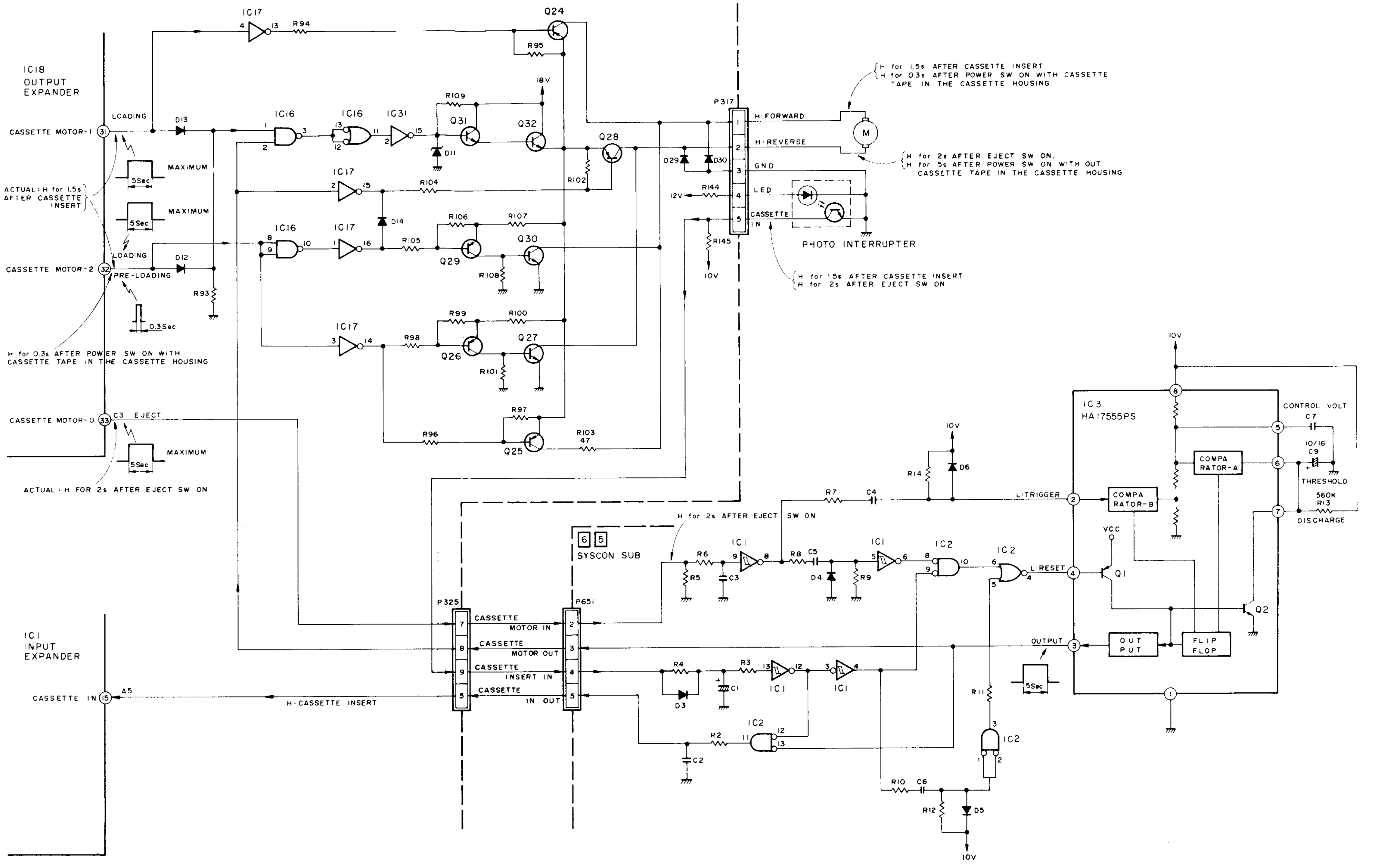
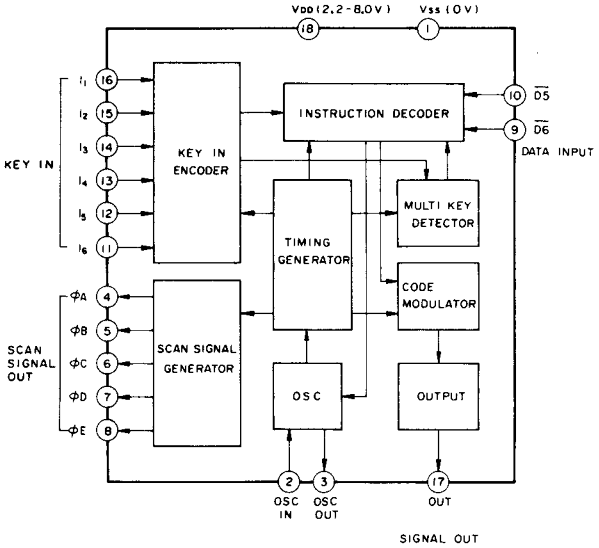

IC18
OUTPUT
EXPANDER
CASSETTE MOTOR-1 31
LOADING
D13
MAXIMUM
5Sec
ACTUAL: H for 1.5s AFTER CASSETTE INSERT
CASSETTE MOTOR-2 32
LOADING
PRE-LOADING
D12
R93
0.3Sec
H for 0.3s AFTER POWER SW ON WITH CASSETTE TAPE IN THE CASSETTE HOUSING
CASSETTE MOTOR-0 33
C3 EJECT
ACTUAL: H FOR 2s AFTER EJECT SW ON
IC17
IC16
IC31
R94
R95
Q24
18V
R109
Q31
Q32
D11
R104
D14
R105
R106
R107
Q29
Q30
R108
R99
R100
R98
Q26
Q27
R101
R97
R96
R103
47
Q25
Q28
R102
P317
D29
D30
R144
12V
R145
10V
H: FORWARD
H: REVERSE
GND
LED
CASSETTE IN
M
PHOTO INTERRUPTER
H for 1.5s AFTER CASSETTE INSERT
H for 0.3s AFTER POWER SW ON WITH CASSETTE TAPE IN THE CASSETTE HOUSING
H for 2s AFTER EJECT SW ON.
H for 5s AFTER POWER SW ON WITH OUT CASSETTE TAPE IN THE CASSETTE HOUSING
H for 1.5s AFTER CASSETTE INSERT
H for 2s AFTER EJECT SW ON
IC1
INPUT
EXPANDER
CASSETTE IN 15
A5
H: CASSETTE INSERT
P325
CASSETTE MOTOR IN
CASSETTE MOTOR OUT
CASSETTE INSERT IN
CASSETTE IN OUT
P651
6 5
SYSCON SUB
H for 2s AFTER EJECT SW ON
R6
R5
C3
R8
C5
D4
R9
R4
R3
D3
C1
R2
C2
IC2
R7
C4
R14
D6
R11
R10
C6
R12
D5
IC3
HA17555PS
L: TRIGGER
L: RESET
OUTPUT
COMPA RATOR-A
COMPA RATOR-B
VCC
Q1
Q2
OUT PUT
FLIP FLOP
CONTROL VOLT
C7
10/16
C9
THRESHOLD
560K
R13
DISCHARGE

Fig. 3-16 Cassette Motor Drive

MODE	D13	D12	IC16-③	IC16-⑪	IC16-⑩	IC17-⑬	IC17-⑮	IC31-⑮	IC17-⑯	IC17-⑭	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	R103 47 Ω	CASSETTE MOTOR
Cassette inserted	OFF ↓ ON	OFF ↓ ON	High	Low		High ↓ Low		High		High ↓ Low	OFF ↓ ON	OFF ↓ ON	OFF ↓ ON	OFF ↓ ON			OFF	ON	ON		FORWARD ⟶
Cassette present in cassette housing **POWER ON**	OFF	OFF ↓ ON	High	Low				High		High ↓ Low	H	OFF ↓ ON	OFF ↓ ON	OFF ↓ ON			OFF	ON	ON	Cassette ejecting direction	FORWARD Low torque ⟶
High at IC3 pin 3 of the system control subboard	OFF	OFF	High	Low	High		High ↓ Low	High	Low						OFF ↓ ON	OFF ↓ ON	ON	ON	ON		REVERSE ⟵

Table 3-8

3.2.15 Operation-A circuit



VDD (2.2-8.0V)
VSS (0V)
18
1
KEY IN
I1
I2
I3
I4
I5
I6
16
15
14
13
12
11
KEY IN ENCODER
INSTRUCTION DECODER
10 D5
9 D6
DATA INPUT
MULTI KEY DETECTOR
TIMING GENERATOR
CODE MODULATOR
SCAN SIGNAL OUT
φA
φB
φC
φD
φE
4
5
6
7
8
SCAN SIGNAL GENERATOR
OSC
OUTPUT
2
3
17
OSC IN
OSC OUT
OUT
SIGNAL OUT

Fig. 3-17 Parallel to Serial Encoder (M50115AP)

1. This circuit produces serial data for each mode according to the depressed operation key of the mainframe or remote control unit.

   The infrared transmitter IC for the remote control system consists of oscillator, timing generator, scan signal generator, key encoder, instruction decoder, multi key detector, code modulater and output buffer circuits.

   Inputs are comprised of 6 x 5 key matrix and data inputs $\overline{D5}$ and $\overline{D6}$. Code system is 10-bit PCM. Power consumption is minimized by stopping the oscillation in absorved of a key input.

2. Oscillator Circuit
   The M50115AP includes an internal MOS inverter and a high bias resistance. The oscillator circuit consists of 3 ceramic oscillators and 2 capacitors. Oscillation frequency is 455 kHz.

3. Key Input
   Commands can be transmitted by key inputs I_1 through I_6, 6 x 5 matrix scan outputs ϕA through ϕE, or data inputs of $\overline{D5}$ and $\overline{D6}$. In event of two or more key matrix inputs, the transmission output code becomes inhibited. However, multi-inputs are allowed for recording and audio dub.

4. Transmission Signal
   In the 10-bit code, K_0 to K_2 are for transmitting and receiving signals, D_0 through D_4 correspond to the key matrix, and D_5 and D_6 are determined by the data inputs of $\overline{D5}$ and $\overline{D6}$.

   The key code K_0 to K_2 is fixed at 1, 0, 0.

OPERATION KEY	KEY CODE			TRANSMISSION CODE						
	K0	K1	K2	D0	D1	D2	D3	D4	D5	D6
STOP SW	1	0	0	1	1	0	0	0	0	0
PLAY SW	1	0	0	0	0	1	1	0	0	0
PLAY+REC SW	1	0	0	0	0	1	1	0	1	1
PLAY+A.DUB SW	1	0	0	0	0	1	1	0	1	0
SEARCH FWD SW	1	0	0	0	1	1	1	0	0	0
SEARCH REV SW	1	0	0	1	1	1	1	0	0	0
FF SW	1	0	0	0	1	1	0	0	0	0
REW SW	1	0	0	1	1	1	0	0	0	0
STILL SW	1	0	0	1	0	1	1	0	0	0
REC E·E	1	0	0	0	0	1	1	0	0	1
SPEED UP	1	0	0	0	0	1	0	1	0	0
SPEED DOWN	1	0	0	1	0	1	0	1	0	0

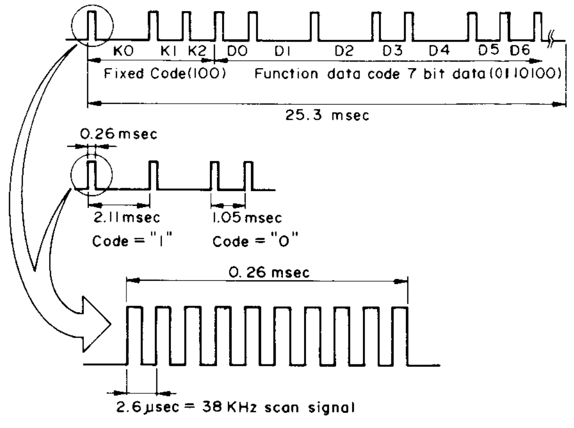
Table 3-9 Transmission code

- All 0 and all 1 are not used in order to avoid misoperation.
- Speed up/down operated only from remote control unit.

5. Code Format
   Transmission signal carrier is 38 kHz and the oscillator frequency is 455 kHz. The H level of the transmission signal 0.26 msec, which is equivalent to ten 38 kHz pluses.

   Codes 0 and 1 are detected by changing the pulse interval. As shown in Fig. 3-19, the interval between two pulses is adjusted to 1.05 msec for code 0 and to 2.11 msec for code 1.

   One command word consists of 10 bits, i.e., 11 pulses, and is transmitted in a period of 25.3 msec while a key input is applied.



K0
K1
K2
D0
D1
D2
D3
D4
D5
D6
Fixed Code(100)
Function data code 7 bit data(0110100)
25.3 msec
0.26 msec
2.11 msec
Code = "1"
1.05 msec
Code = "0"
0. 26 msec
2.6μsec = 38 KHz scan signal

Fig. 3-18

6. Data Inputs
   Data inputs $\overline{D5}$ and $\overline{D6}$ correspond to transmission codes D5 and D6 respectively. Therefore, a low input at $\overline{D5}$ yields a "1" output from D5, while L at $\overline{D6}$ results in "1" from D6.

3.2.16 Counter circuit

The counter circuit consists of two microcomputers and fluorescent display tubes. The circuit controls the fluorescent display tubes to show the required mode in accordance with commands from the syscon circuit.

For example, when a command signal is supplied to ports PA and $\overline{\text{INT}}$ of IC1 (counter), and the IC1 port PE output goes to the PA port of IC2 (driver), while the PD and PE port outputs of IC1 become the drive signals for the fluorescent display tubes. Colon display is driven by port PD of IC1.

1. The tape counter counts up to ±9999.
2. The lap counter counts up to 9: 59: 59.

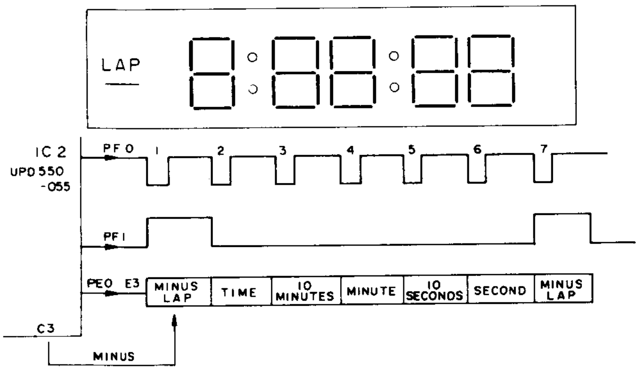


Fig. 3-19

The Minus display changes to LAP display when PF1 of IC2 is high level, after which hour → 10 minutes → minutes → 10 seconds → seconds data are stored in the microcomputer for driving the display tubes.

3. The tape pulse is obtained by 1/16 count down of the reel FG pulse in the system control circuit.
4. Counter IC1 (UPD554-058) contains of two memory counters, one for the reel pulse and the other for the capstan pulse.
5. The up/down signal selects counting direction for the tape and capstan pulses.
6. LAP SW
   This is for switching the tape counter and LAP displays.
7. Reset SW
   When set on during LAP, the display tubes indicate $\boxed{\text{LAP 0:00:00}}$.

   When set on during counter, the display tubes indicate $\boxed{\qquad\qquad 0}$.
8. Tape End
   During recording, when 5 minites (about 0.7 meter) of tape remains, syscon commend to IC2 flashes the display tubes.
9. Zero Out (counter output)
   Reel FG pulses are counted during counter stop and counter repeat operation. High is produced when the tape counter display reaches zero. Since counting is also performed during LAP operation, high becomes produced at zero.

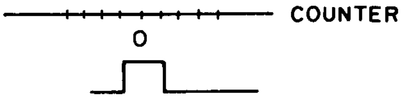


Fig. 3-20

10. Access
    In order to stop accurately at 0 in counter stop or zero search operation, high supplied to the reel servo decreases the speed for the ±99 to 0 range during FF/REW.

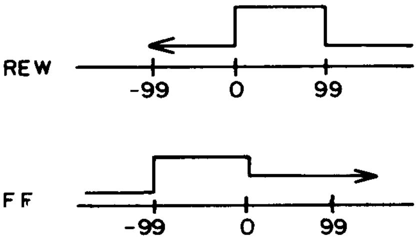


Fig. 3-21

3.2.17 Junction circuit

Commands enter this circuit from the 45-pin connector, the front panel 7-pin connector, and from the mainframe key. The commands are processed and sent to the system control circuit. Refer to Fig. 3-22.

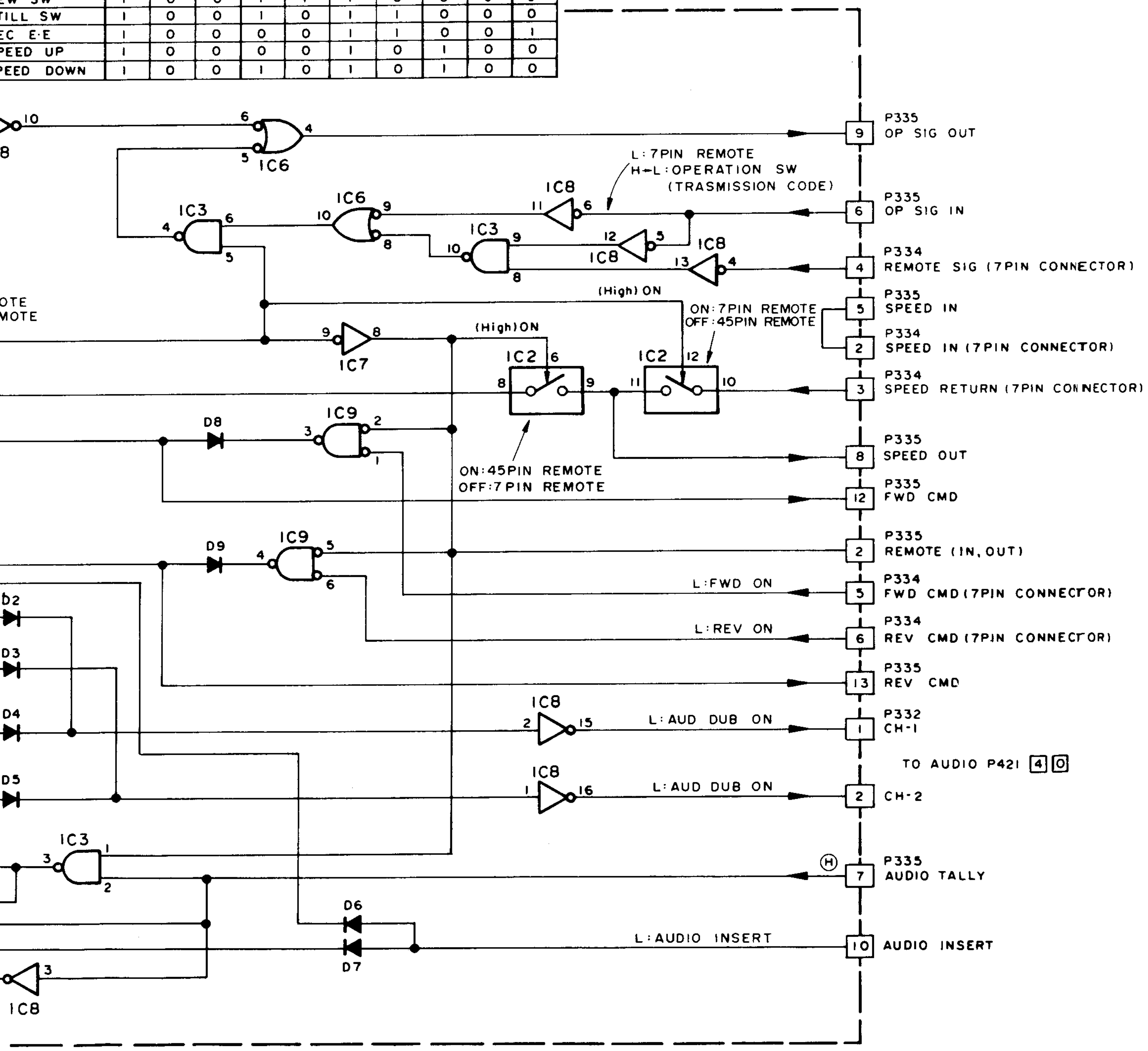
1. 45-pin remote control commands
   Independently arriving commands are converted to serial code by the encoder IC of the junction board. (The operation of IC1 is outlined in 3.1.17 Operation-A).

   The remote switching signal sets priority to the 45-pin remote control unit.

   Q1: This transistor is for switching the REC and AUD DUB modes.
2. When the 45-pin remote control unit is connected, low from pin 11 of remote command P331 through an open collector inverter switches IC2 on.
   The search speed (V speed) output from P331 pin 14 is supplied to the system control via P335 pin 8 and IC2.

to-
on-
he

PERATION KEY	KEY CODE			TRANSMISSION CODE						
	K0	K1	K2	D0	D1	D2	D3	D4	D5	D6
TOP SW	1	0	0	1	1	0	0	0	0	0
LAY SW	1	0	0	0	0	1	1	0	0	0
LAY+REC SW	1	0	0	0	0	1	1	0	1	1
LAY+A.DUB SW	1	0	0	0	0	1	1	0	1	0
EARCH FWD SW	1	0	0	0	1	1	1	0	0	0
EARCH REV SW	1	0	0	1	1	1	1	0	0	0
F SW	1	0	0	0	1	1	0	0	0	0
EW SW	1	0	0	1	1	1	0	0	0	0
TILL SW	1	0	0	1	0	1	1	0	0	0
EC E·E	1	0	0	0	0	1	1	0	0	1
PEED UP	1	0	0	0	0	1	0	1	0	0
PEED DOWN	1	0	0	1	0	1	0	1	0	0



8
10
IC6
6
5
4
P335
OP SIG OUT
9
L: 7PIN REMOTE
H→L: OPERATION SW
(TRASMISSION CODE)
IC3
IC6
IC8
P335
OP SIG IN
6
IC3
IC8
IC8
P334
REMOTE SIG (7PIN CONNECTOR)
4
OTE
MOTE
(High) ON
ON: 7PIN REMOTE
OFF: 45PIN REMOTE
P335
SPEED IN
5
P334
SPEED IN (7PIN CONNECTOR)
2
IC7
(High)ON
IC2
IC2
P334
SPEED RETURN (7PIN CONNECTOR)
3
D8
IC9
P335
SPEED OUT
8
ON: 45PIN REMOTE
OFF: 7PIN REMOTE
P335
FWD CMD
12
D9
IC9
P335
REMOTE (IN, OUT)
2
L: FWD ON
P334
FWD CMD (7PIN CONNECTOR)
5
D2
L: REV ON
P334
REV CMD (7PIN CONNECTOR)
6
D3
P335
REV CMD
13
D4
IC8
L: AUD DUB ON
P332
CH-1
1
TO AUDIO P421 4 0
D5
IC8
L: AUD DUB ON
CH-2
2
IC3
H
P335
AUDIO TALLY
7
D6
D7
L: AUDIO INSERT
AUDIO INSERT
10
IC8

Fig. 3-22

3.2.19 Long still (IC28, HA17555PS)

Excessive duration of the Still mode is detrimental to the tape and magnetic heads. Therefore, two or three minutes after the Still mode has been entered, the monostable multivibrator of IC28 produces the long still command for reducing reel servo tension at the supply reel. The timing chart is shown in Fig. 3-24.

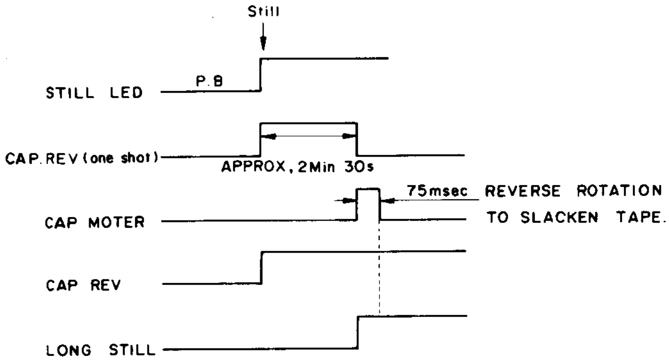


Fig. 3-24

3.2.20 Pause, Still and Pre-roll

Simultaneously pressing the record and play keys during the Play mode yields the Recording mode. At this time, pressing the pause key produces Pause mode after about 2.4 seconds of tape rewind.

Again pressing the play key releases the Pause mode and recording is resumed after 2.4 seconds of playback. This process serves to avoid disruption at the recording juncture (editing point).

If the pre-roll key of the remote control unit is pressed, the tape becomes rewound at X2 speed for 4 seconds, then at 1/5-speed for 1 second.

When the still key is pressed during the Play mode, the capstan motor stops and the Still mode becomes set.

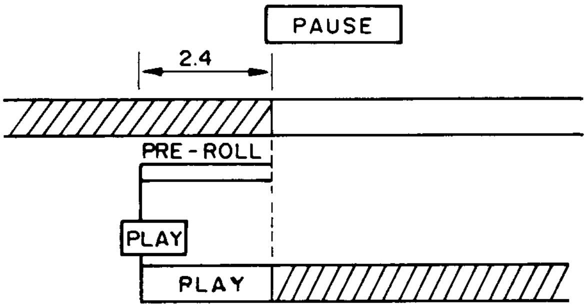


Fig. 3-25

The low remote command at IC3 pin 5 holds the pin 4 output high, and the transmission code from IC1 pin 17 is supplied to pin 6 of IC6 through open collector inverter IC8. The output of pin 4 varies according to the pin 6 input of IC6 and this becomes the transmission code supplied to the system control as the mode command signal through P335 pin 9.

The remote command (pin 2 of P335) results in a high output which cuts off the FWD and REV commands of the search speed circuit (IC29) on the system control board and discharges C9.
The high input goes to pins 1, 2, 5 and 6 of IC9. Low from pins 3 and 4 cuts off D8 and D9, which gives priority to the remote control FWD and REV commands.

3. Audio Insert (audio-1)
   Pressing the audio insert key sends low from P331 pin 12 and D6 switches on. This low is supplied to the system control and becomes the audio insert command signal.

   The returning (audio tally) high signal is supplied to the remote control unit through pin 7 of P335. High at IC3 input sets the pin 3 output low, which is supplied to pin 12 of IC5. D2 switches on and high from IC5 is supplied to P421 of the audio board via P335 pin 1 and an open collector inverter.

   Operations are the same for the audio-2 insert and front panel audio dub CH-1 and CH-2 circuits.

   *If the audio-1 and audio-2 insert keys are pressed simultaneously, audio dub becomes set for chanel 1.

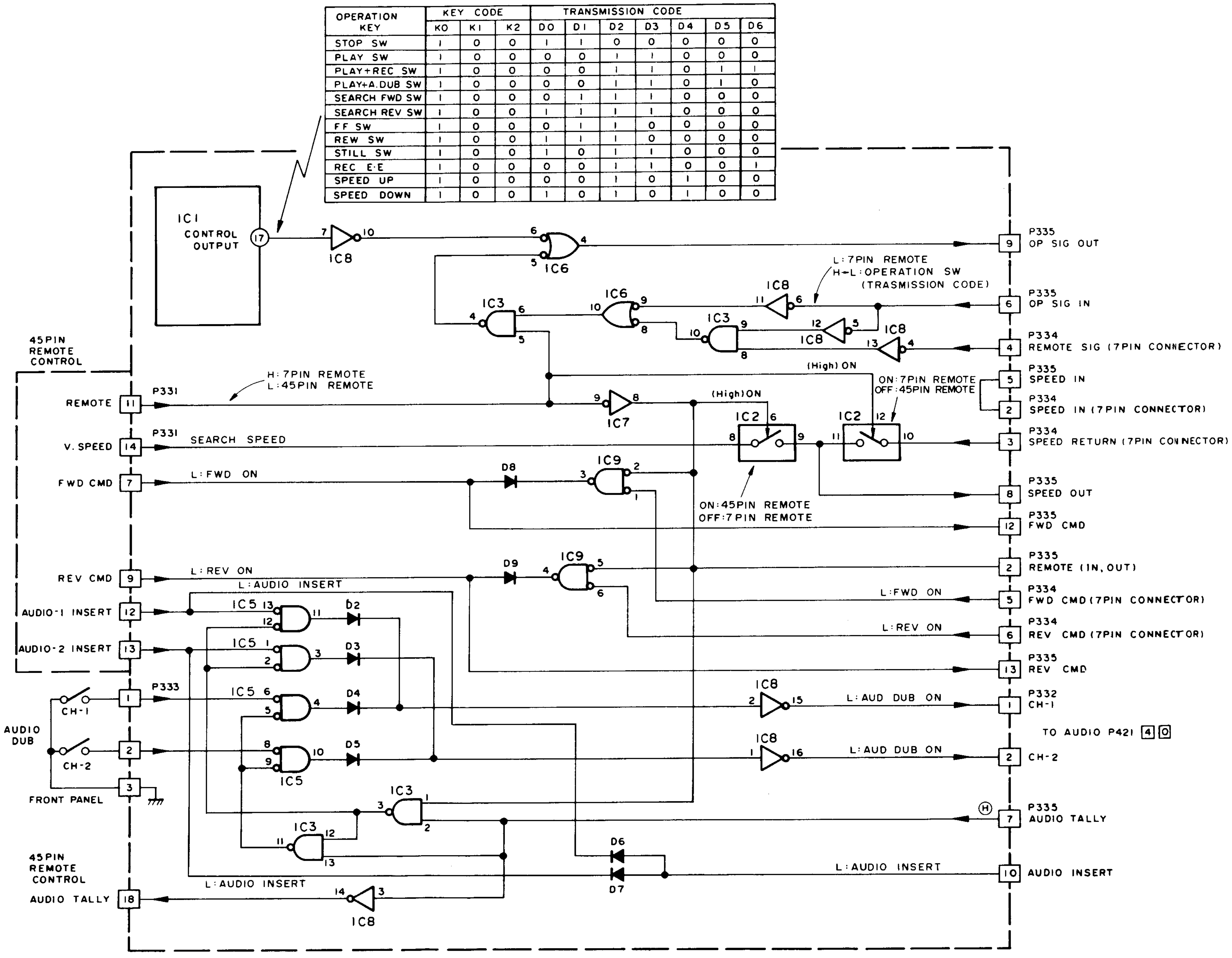
4. When the 45-pin remote control is removed and the 7 pin wired remote control unit is connected, high from pin 11 of P331 (remote) switches IC2 on.

   The search speed (speed return) output is supplied to the system control from pin 8 (speed out) of P335 through pin 3 of P334 and IC2.

   Low from IC1 pin 7 becomes high through open collector inverter IC8, which goes to IC6 pin 6. The output from IC6 pin 4 varies according to the pin 5 input and this coded output is supplied to the system control via P335 pin 9 as the mode command signal.

   High from pin 11 of P331 (remote) becomes low through IC7 inverter and is supplied to pins 2 and 5 of IC9. At the same time, high potential is applied to IC9 pin 1 and 6, and the resulting low outputs from pins 3 and 4 switch D8 and D9 on. This cuts off the FWD and REW commands from the 45-pin remote control unit.

5. 7-pin wireless remote control unit
   Connecting the light detecting module automatically shorts pins 2 and 3 of the 7-pin connector. Afterwards, operation is the same as the wired remote control unit.



OPERATION KEY	KEY CODE			TRANSMISSION CODE						
	K0	K1	K2	D0	D1	D2	D3	D4	D5	D6
STOP SW	1	0	0	1	1	0	0	0	0	0
PLAY SW	1	0	0	0	0	1	1	0	0	0
PLAY+REC SW	1	0	0	0	0	1	1	0	1	1
PLAY+A.DUB SW	1	0	0	0	0	1	1	0	1	0
SEARCH FWD SW	1	0	0	0	1	1	1	0	0	0
SEARCH REV SW	1	0	0	1	1	1	1	0	0	0
FF SW	1	0	0	0	1	1	0	0	0	0
REW SW	1	0	0	1	1	1	0	0	0	0
STILL SW	1	0	0	1	0	1	1	0	0	0
REC E·E	1	0	0	0	0	1	1	0	0	1
SPEED UP	1	0	0	0	0	1	0	1	0	0
SPEED DOWN	1	0	0	1	0	1	0	1	0	0

IC1
CONTROL OUTPUT
17
IC8
IC6
IC3
IC7
IC2
IC9
IC5
45PIN REMOTE CONTROL
P331
REMOTE 11
V. SPEED 14
FWD CMD 7
REV CMD 9
AUDIO-1 INSERT 12
AUDIO-2 INSERT 13
H: 7PIN REMOTE
L: 45PIN REMOTE
SEARCH SPEED
L: FWD ON
L: REV ON
L: AUDIO INSERT
D8
D9
D2
D3
D4
D5
D6
D7
P333
AUDIO DUB
CH-1
CH-2
FRONT PANEL
45PIN REMOTE CONTROL
AUDIO TALLY 18
L: 7PIN REMOTE
H→L: OPERATION SW (TRASMISSION CODE)
(High) ON
ON: 7PIN REMOTE
OFF: 45PIN REMOTE
ON: 45PIN REMOTE
OFF: 7PIN REMOTE
L: AUD DUB ON
P335 9 OP SIG OUT
P335 6 OP SIG IN
P334 4 REMOTE SIG (7PIN CONNECTOR)
P335 5 SPEED IN
P334 2 SPEED IN (7PIN CONNECTOR)
P334 3 SPEED RETURN (7PIN CONNECTOR)
P335 8 SPEED OUT
P335 12 FWD CMD
P335 2 REMOTE (IN, OUT)
P334 5 FWD CMD (7PIN CONNECTOR)
P334 6 REV CMD (7PIN CONNECTOR)
P335 13 REV CMD
P332 1 CH-1
TO AUDIO P421 4 0
2 CH-2
H
P335 7 AUDIO TALLY
10 AUDIO INSERT

Fig. 3-22

3.2.18 Tape end solenoid control circuit

1. Search forward mode
   When the tape end is detected during the search forward mode, low output from pin 1 of P303 switches diode D32 on. Through open collector inverter IC32, D6 becomes cutoff.

   The resulting high goes to input pins 8 and 9 of IC13, and low from output pin 10 switches on diodes D36 and D37.

   Low potential through IC30 inverter cuts off Q10 and Q14, at which time the brake and pinch solenoids stop the reels.

   Following this, a high pulse from IC13 pin 28 (X2 speed) is supplied to pin 5 of IC13, yielding low from pin 4. Via open collector inverter IC8, high switches on diodes D34 and D35, and drives Q9 and Q13. The brake and pinch solenoids are energized through inverter IC31 and rewind of the trailer tape starts. Afterwards, the Still mode becomes set.

2. Search reverse mode
   When the tape start is detected during the search reverse mode, the leader tape is rewound and the Still mode entered.

   The operation principle is the same as the search forward mode.
   Timing chart is shown in Fig. 3-23.

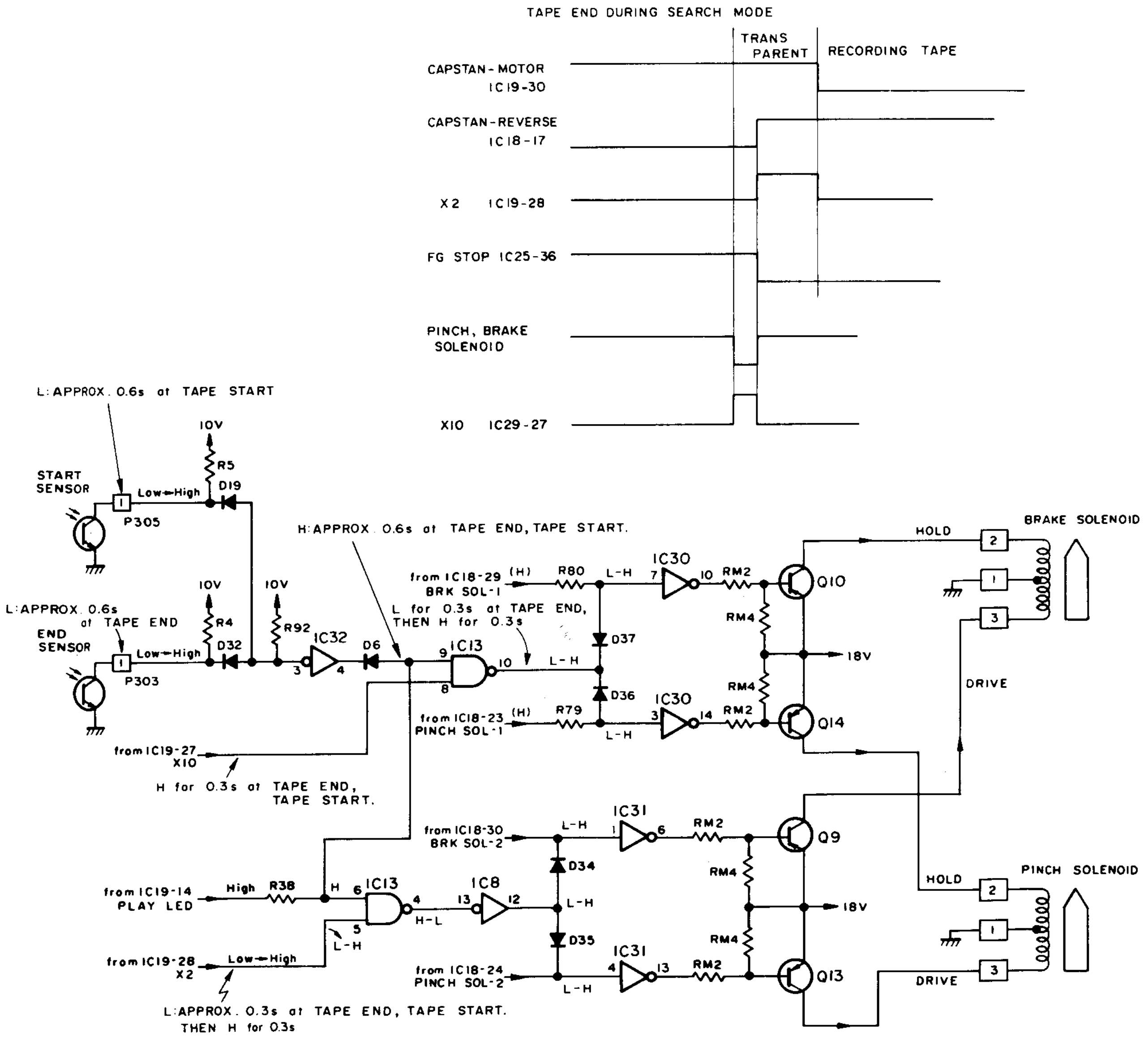

TAPE END DURING SEARCH MODE
TRANS PARENT
RECORDING TAPE
CAPSTAN-MOTOR IC19-30
CAPSTAN-REVERSE IC18-17
X2 IC19-28
FG STOP IC25-36
PINCH, BRAKE SOLENOID
X10 IC29-27
L: APPROX. 0.6s at TAPE START
10V
R5
D19
START SENSOR
Low→High
P305
H: APPROX 0.6s at TAPE END, TAPE START.
L: APPROX 0.6s at TAPE END
END SENSOR
R4
D32
Low→High
P303
10V
R92
IC32
D6
IC13
L for 0.3s at TAPE END, THEN H for 0.3s
from IC18-29 (H) BRK SOL-1
R80
L-H
IC30
RM2
RM4
Q10
D37
D36
18V
from IC18-23 (H) PINCH SOL-1
R79
Q14
from IC19-27 X10
H for 0.3s at TAPE END, TAPE START.
HOLD
BRAKE SOLENOID
DRIVE
from IC18-30 BRK SOL-2
IC31
Q9
D34
D35
from IC19-14 PLAY LED
High
R38
IC8
H-L
from IC19-28 X2
Low→High
from IC18-24 PINCH SOL-2
Q13
PINCH SOLENOID
L: APPROX. 0.3s at TAPE END, TAPE START. THEN H for 0.3s

Fig. 3-23

3.2.19 Long still (IC28, HA17555PS)

Excessive duration of the Still mode is detrimental to the tape and magnetic heads. Therefore, two or three minutes after the Still mode has been entered, the monostable multivibrator of IC28 produces the long still command for reducing reel servo tension at the supply reel. The timing chart is shown in Fig. 3-24.

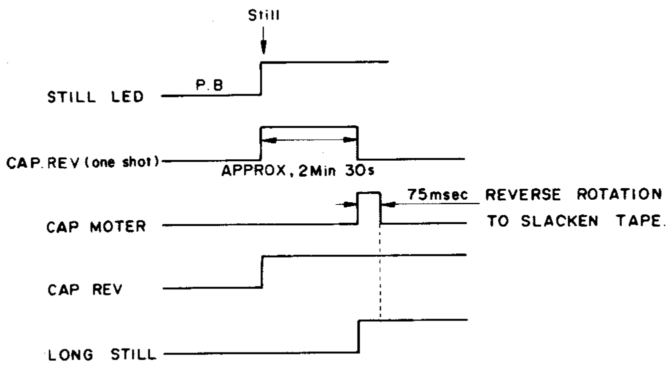

Still
STILL LED
P.B
CAP. REV (one shot)
APPROX. 2Min 30s
75msec
REVERSE ROTATION TO SLACKEN TAPE.
CAP MOTER
CAP REV
LONG STILL

Fig. 3-24

3.2.20 Pause, Still and Pre-roll

Simultaneously pressing the record and play keys during the Play mode yields the Recording mode. At this time, pressing the pause key produces Pause mode after about 2.4 seconds of tape rewind.

Again pressing the play key releases the Pause mode and recording is resumed after 2.4 seconds of playback. This process serves to avoid disruption at the recording juncture (editing point).

If the pre-roll key of the remote control unit is pressed, the tape becomes rewound at X2 speed for 4 seconds, then at 1/5-speed for 1 second.

When the still key is pressed during the Play mode, the capstan motor stops and the Still mode becomes set.

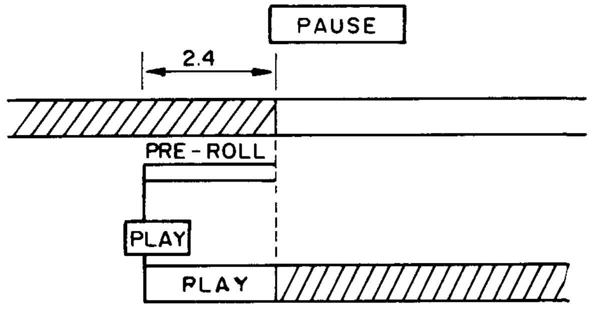
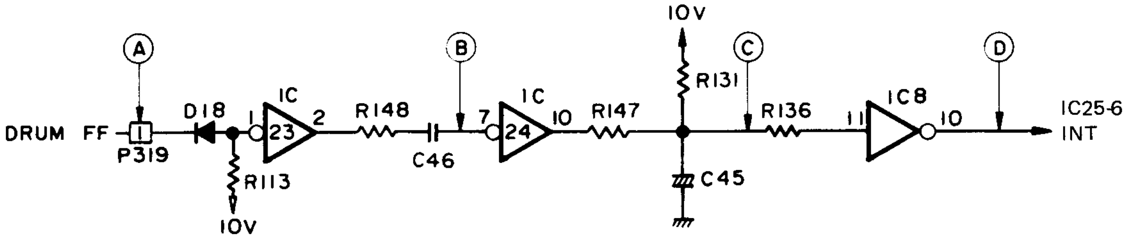

PAUSE
2.4
PRE-ROLL
PLAY
PLAY

Fig. 3-25

3.2.21 Drum stop detecting circuit


Ⓐ
Ⓑ
Ⓒ
Ⓓ
DRUM FF
1
P319
D18
R113
10V
IC 23
1
2
R148
C46
7
IC 24
10
R147
10V
R131
C45
R136
11
IC8
10
IC25-6
INT

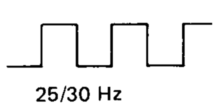
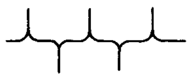
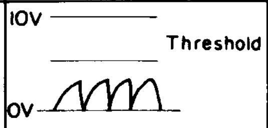
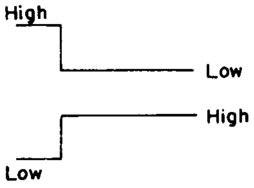
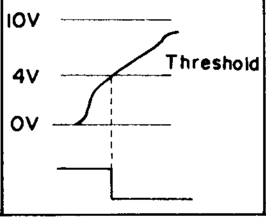
	Ⓐ CATHODE DIODE	Ⓑ IC24 PIN7 INPUT	Ⓒ C 45 CHARGE VOLTAGE	Ⓓ IC8 PIN 10 OUTPUT
NORMAL DRUM PULSE			 10V Threshold 0V	HIGH
DRUM PULSE DELATED	 High Low High Low	LOW	 10V Threshold 4V 0V	LOW

Fig. 3-26

1. Normal drum rotation

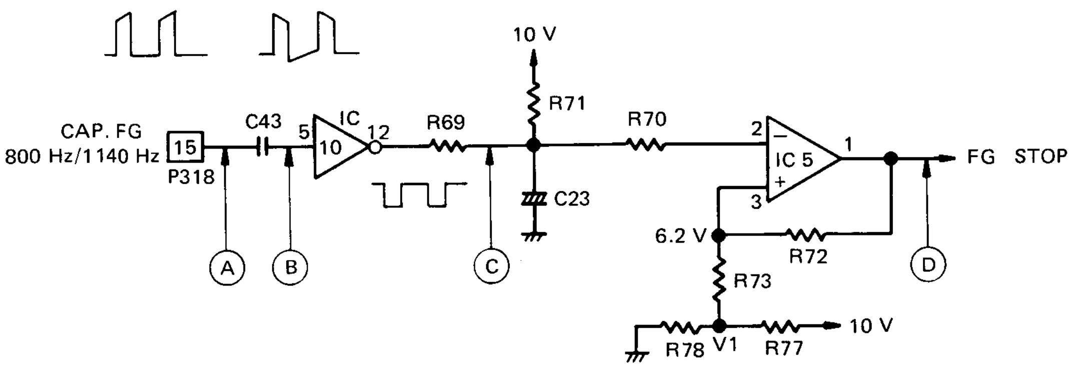
   The drum pulse (25 Hz/30 Hz) of the drum board goes via P314 pin 1 to the cathode of diode D8, then through open collector inverter IC23. Via IC24, R148 and C46 differentiate the pulse result in the control signal with time constant determined by R147 and C45. Since C45 charge does not exceed the threshold voltage (about 4 V), high output from IC8 pin 10 (Schmitt circuit) signifies normal drum rotation.

2. Slow drum rotation

   When the drum rotation lags, according to the drum flipflop state, either a high or low output is supplied to the cathode of diode D8. This voltage goes through open collector inverter IC23 and R148 to capacitor C46.

   Low at IC24 pin 7 cuts the DC component of C46 and charges C45 via the inverter circuit of IC24. When this charge exceeds the threshold voltage (about 4 V), the low pin 10 output interrupts the microcomputer and sets the warning mode.

3.2.22 Capstan stop detecting circuit



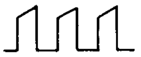
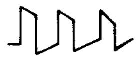
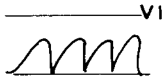
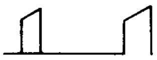
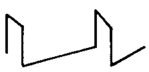
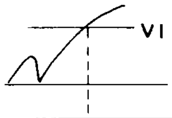
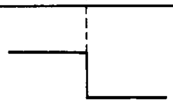
	Ⓐ CAP. FG INPUT PULSE	Ⓑ IC 10 PIN5 INPUT	Ⓒ C23 CHARGE VOLTAGE	Ⓓ IC5 PIN I OUT PUT
NORMAL CAPSTAN PULSE	 800 Hz/1140 Hz			HIGH
CAPSTAN PULSE DELAYED				LOW
				

Fig. 3-27

1. Normal capstan FG pulse
   The capstan FG pulse (800 Hz/1140 Hz) from the capstan board is supplied to C43 through pin 15 of connector P318. After waveform shaping, the becomes the control signal through IC10 with time constant dtermined by R69 and C23. Since C23 charge does not exceed fixed voltage V_1 (about 7 V) divided by R77 and R78, the high output from IC5 pin 1 signifies normal capstan FG rotation.

2. Delayed FG pulse interval
   As the FG pulse interval produced by capstan rotation increases, low potential through C43 and IC10 charges C23 at the time constant of R 71 and C23. When the charge exceeds fixed voltage V_1 (about 6 V divided by R77 and R78), low from output pin 1 of IC5 indicates capstan FG interruption. For example, when the reverse key is pressed during the search forward mode, the capstan rotation slows. Absence of the capstan FG pulse is detected and reverse voltage applied to stop the capstan motor, then the reverse mode becomes entered.

3.2.23 System control block diagram

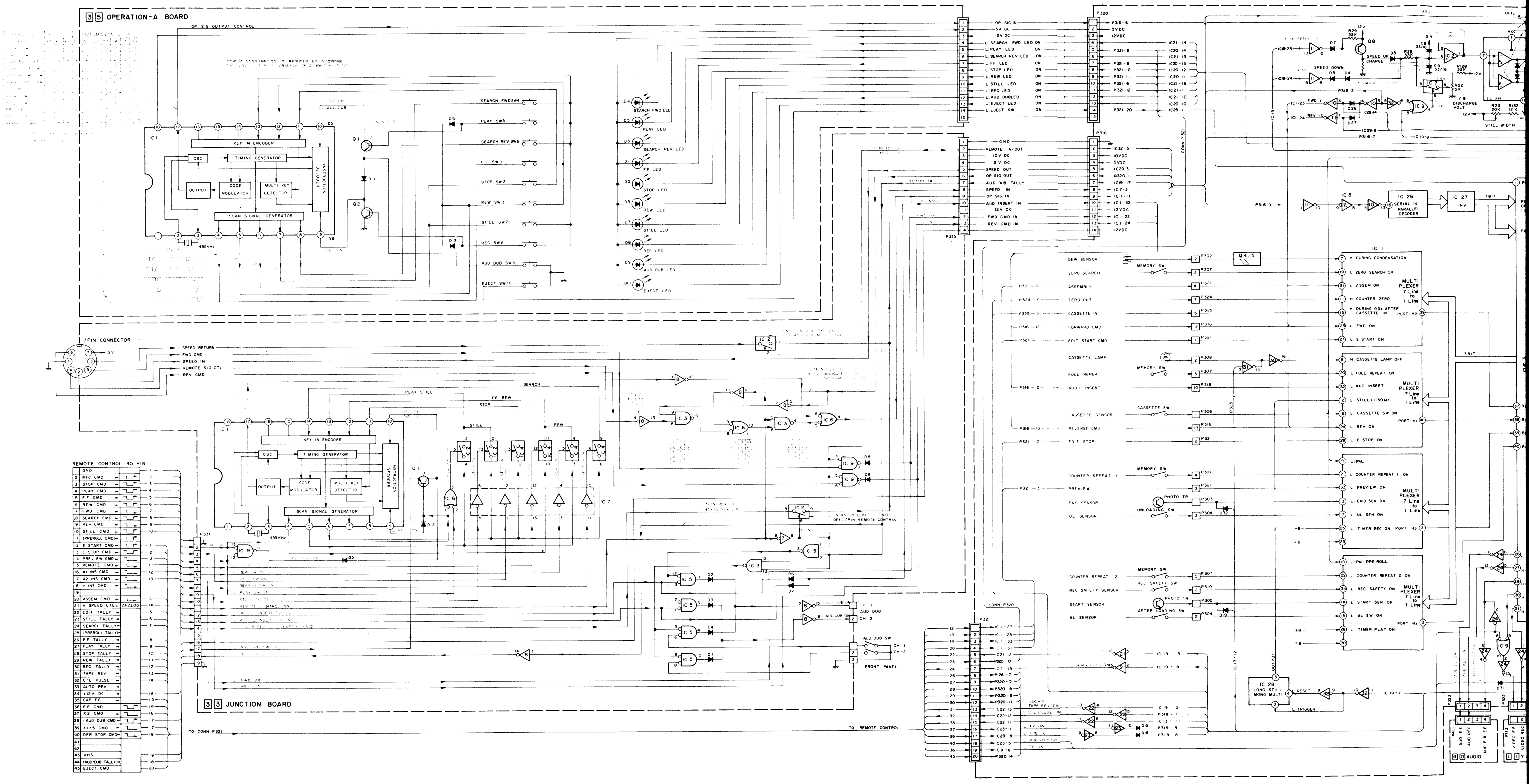
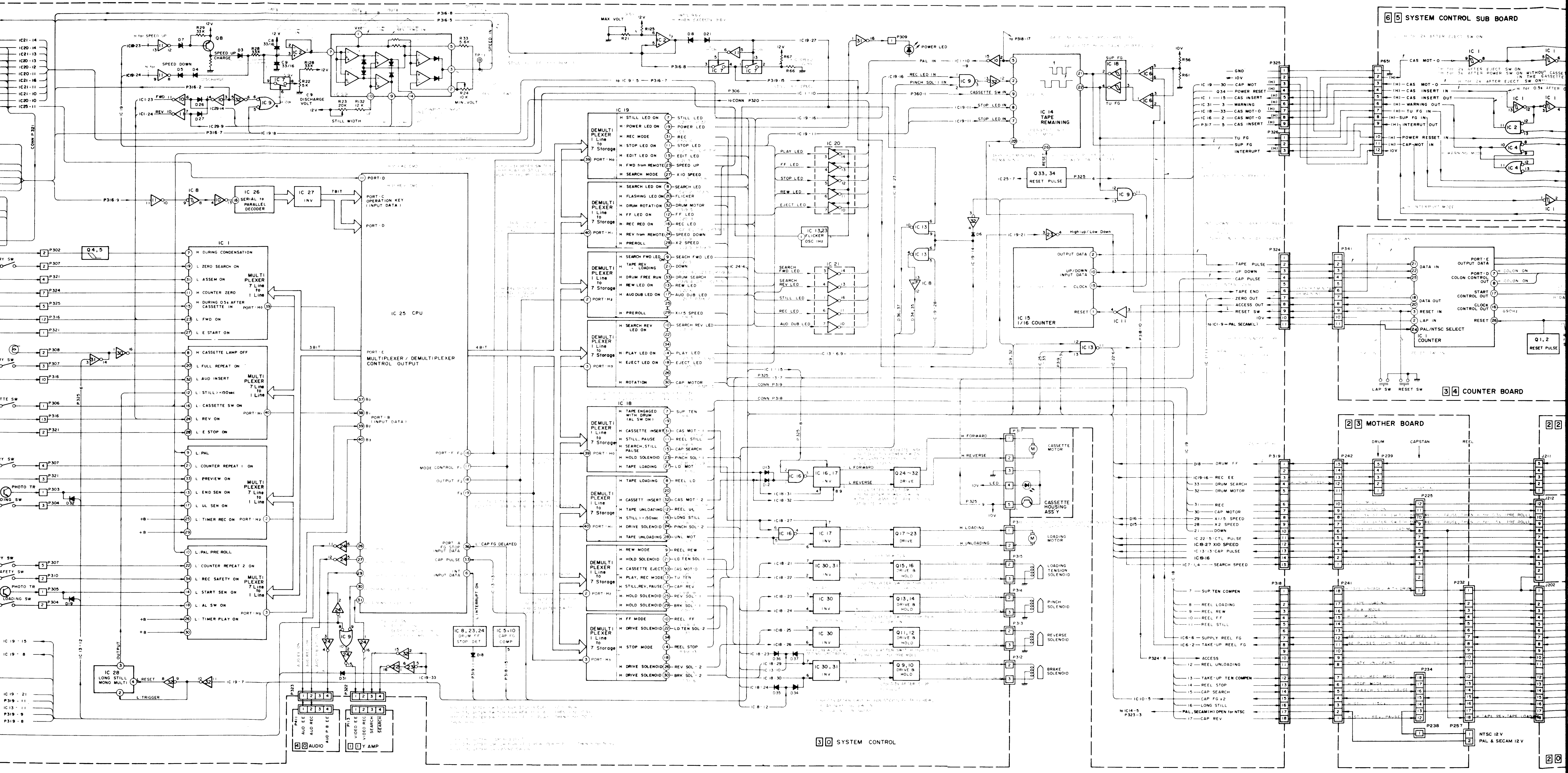
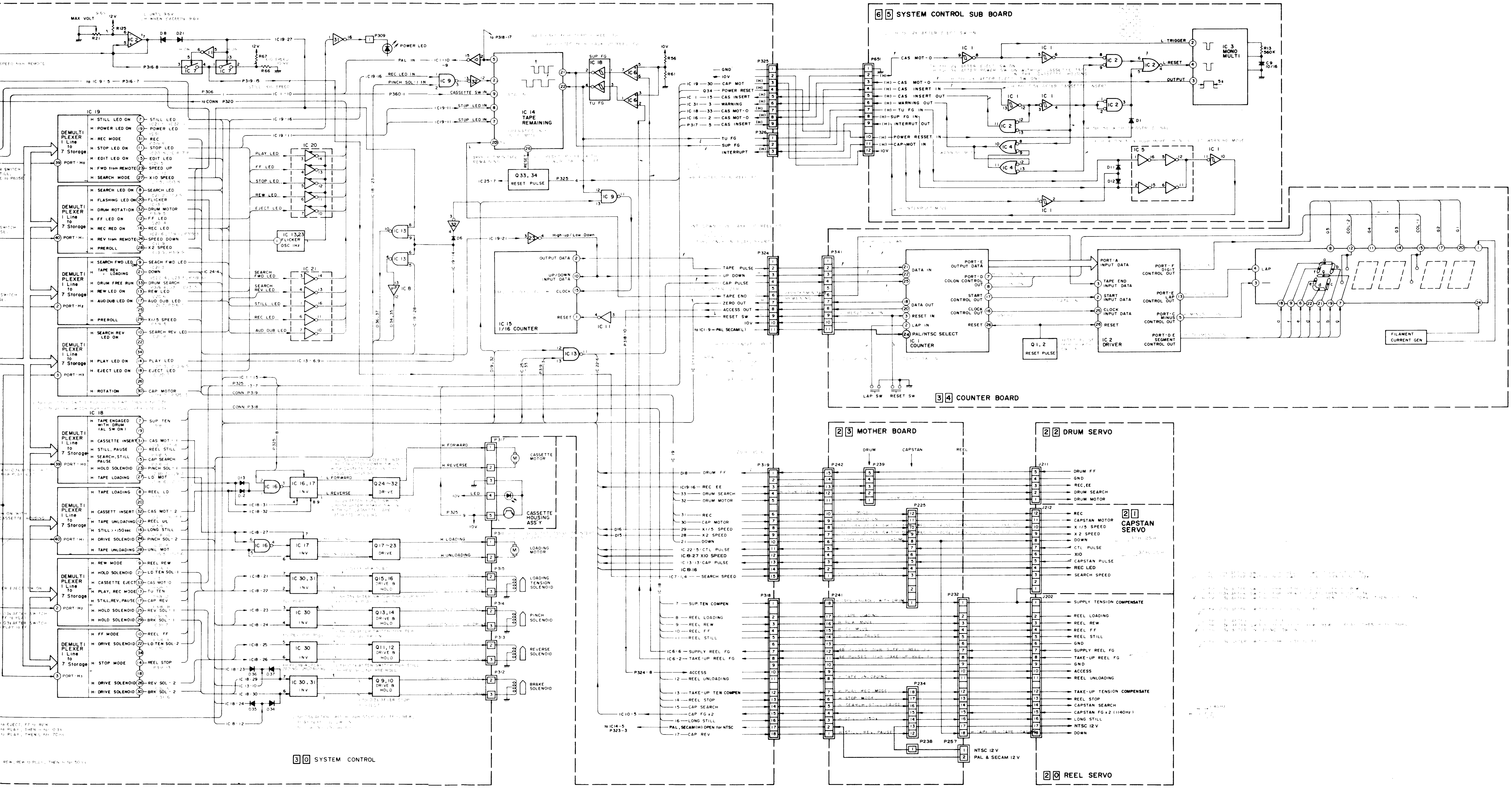

3 5 OPERATION-A BOARD
OP SIG OUTPUT CONTROL
IC 1
KEY IN ENCODER
OSC
TIMING GENERATOR
INSTRUCTION DECODER
OUTPUT
CODE MODULATOR
MULTI KEY DETECTOR
SCAN SIGNAL GENERATOR
455KHz
SEARCH FWD SW4
PLAY SW5
SEARCH REV SW6
FF SW1
STOP SW2
REW SW3
STILL SW7
REC SW8
AUD DUB SW9
EJECT SW10
SEARCH FWD LED
PLAY LED
SEARCH REV LED
FF LED
STOP LED
REW LED
STILL LED
REC LED
AUD DUB LED
EJECT LED
OP SIG IN
5V DC
12V DC
L SEARCH FWD LED ON
L PLAY LED ON
L SEARCH REV LED ON
L FF LED ON
L STOP LED ON
L REW LED ON
L STILL LED ON
L REC LED ON
L AUD DUBLED ON
L EJECT LED ON
L EJECT SW ON
P320
P316
P335
GND
REMOTE IN/OUT
10V DC
5V DC
SPEED OUT
OP SIG OUT
AUD DUB TALLY
SPEED IN
OP SIG IN
AUD INSERT IN
12V DC
FWD CMD IN
REV CMD IN
CONN P321
7PIN CONNECTOR
SPEED RETURN
FWD CMD
SPEED IN
REMOTE SIG CTL
REV CMD
SEARCH
PLAY STILL
FF REW
STOP
STILL
REW
IC 2
IC 3
IC 5
IC 6
IC 7
IC 8
IC 9
3 3 JUNCTION BOARD
AUD DUB SW
CH-1
CH-2
AUD DUB
FRONT PANEL
TO CONN P321
TO REMOTE CONTROL
CONN P320
REMOTE CONTROL 45 PIN
1 GND
2 REC CMD
3 STOP CMD
4 PLAY CMD
5 FF CMD
6 REW CMD
7 FWD CMD
8 SEARCH CMD
9 REV CMD
10 STILL CMD
11 (PREROLL CMD)
12 E.START CMD
13 E.STOP CMD
14 PREVIEW CMD
15 REMOTE CMD
16 A1 INS CMD
17 A2 INS CMD
18 V INS CMD
19
20 ASSEM CMD
21 V SPEED CTL ANALOG
22 EDIT TALLY
23 STILL TALLY
24 SEARCH TALLY
25 (PREROLL TALLY)
26 FF TALLY
27 PLAY TALLY
28 STOP TALLY
29 REW TALLY
30 REC TALLY
31 TAPE REV
32 CTL PULSE
33 AUTO REV
34 +12V DC
35 CAP FG
36 EE CMD
37 X2 CMD
38 (AUD DUB CMD)
39 X1/5 CMD
40 DFR STOP CMD
41
42
43 VHS
44 (AUD DUB TALLY)
45 EJECT CMD
P331
DEW SENSOR
ZERO SEARCH
ASSEMBLY
ZERO OUT
CASSETTE IN
FORWARD CMD
EDIT START CMD
CASSETTE LAMP
FULL REPEAT
AUDIO INSERT
CASSETTE SENSOR
REVERSE CMD
EDIT STOP
COUNTER REPEAT 1
PREVIEW
END SENSOR
UL SENSOR
COUNTER REPEAT 2
REC SAFETY SENSOR
START SENSOR
AL SENSOR
MEMORY SW
CASSETTE SW
PHOTO TR
UNLOADING SW
REC SAFETY SW
AFTER LOADING SW
Q4,5
IC 1
H DURING CONDENSATION
L ZERO SEARCH ON
L ASSEM ON
H COUNTER ZERO
H DURING 0.5s AFTER CASSETTE IN
L FWD ON
L E START ON
MULTI PLEXER 7 Line to 1 Line
PORT H0
H CASSETTE LAMP OFF
L FULL REPEAT ON
L AUD INSERT
L STILL (+150sec)
L CASSETTE SW ON
L REV ON
L E STOP ON
PORT H1
L PAL
L COUNTER REPEAT 1 ON
L PREVIEW ON
L END SEN ON
L UL SEN ON
L TIMER REC ON
PORT H2
L PAL PRE ROLL
L COUNTER REPEAT 2 ON
L REC SAFETY ON
L START SEN ON
L AL SW ON
L TIMER PLAY ON
PORT H3
IC 26 SERIAL to PARALLEL DECODER
IC 27 INV
7BIT
3BIT
IC 28 LONG STILL MONO MULTI
RESET
TRIGGER
OUTPUT
SPEED UP
CHARGE
SPEED DOWN
DISCHARGE
DISCHARGE VOLT
STILL WIDTH
Q8
IC 29
4 0 AUDIO
P321
P323
P322
TAPE REV ON
STILL PULSE IN
SEARCH TALLY ON

Fig. 3-28



6 5 SYSTEM CONTROL SUB BOARD
3 4 COUNTER BOARD
2 3 MOTHER BOARD
3 0 SYSTEM CONTROL
4 0 AUDIO
1 0 Y AMP
IC 25 CPU
IC 26 SERIAL to PARALLEL DECODER
IC 27 INV
IC 14 TAPE REMAINING
IC 15 1/16 COUNTER
IC 28 LONG STILL MONO MULTI
IC 20
IC 21
IC 13,23 FLICKER OSC 1Hz
Q33, 34 RESET PULSE
IC 1 COUNTER
Q1, 2 RESET PULSE
CASSETTE MOTOR
CASSETTE HOUSING ASS'Y
LOADING MOTOR
LOADING TENSION SOLENOID
PINCH SOLENOID
REVERSE SOLENOID
BRAKE SOLENOID
DEMULTI PLEXER 1 Line to 7 Storage
MULTI PLEXER 7 Line to 1 Line
MULTIPLEXER / DEMULTIPLEXER CONTROL OUTPUT
POWER LED
TAPE PULSE
UP DOWN
CAP PULSE
TAPE END
ZERO OUT
ACCESS OUT
RESET SW
LAP SW
RESET SW
DRUM
CAPSTAN
REEL
NTSC 12 V
PAL & SECAM 12 V

Fig. 3-28



30 SYSTEM CONTROL
65 SYSTEM CONTROL SUB BOARD
34 COUNTER BOARD
23 MOTHER BOARD
22 DRUM SERVO
21 CAPSTAN SERVO
20 REEL SERVO
MAX VOLT
POWER LED
IC 19
IC 18
DEMULTI PLEXER 1 Line to 7 Storage
IC 14 TAPE REMAINING
IC 18 SUP FG TU FG
IC 20
IC 21
IC 13,23 FLICKER OSC 1Hz
Q33, 34 RESET PULSE
IC 15 1/16 COUNTER
OUTPUT DATA
UP/DOWN INPUT DATA
CLOCK
RESET
High-up / Low Down
IC 16,17 INV
Q24~32 DRIVE
L FORWARD
L REVERSE
H FORWARD
H REVERSE
CASSETTE MOTOR
CASSETTE HOUSING ASS'Y
IC 17 INV
Q17~23 DRIVE
H LOADING
H UNLOADING
LOADING MOTOR
IC 30, 31 INV
Q15, 16 DRIVE & HOLD
LOADING TENSION SOLENOID
IC 30 INV
Q13, 14 DRIVE & HOLD
PINCH SOLENOID
Q11, 12 DRIVE & HOLD
REVERSE SOLENOID
Q9, 10 DRIVE & HOLD
BRAKE SOLENOID
IC 1
IC 2
IC 3 MONO MULTI
IC 4
IC 5
L TRIGGER
L RESET
OUTPUT
R13 560K
C9 10/16
CAS MOT-O
CAS INSERT IN
CAS INSERT OUT
WARNING OUT
TU FG IN
SUP FG IN
INTERRUPT OUT
POWER RESET IN
CAP MOT IN
GND
10V
CAP MOT
POWER RESET
CAS INSERT
WARNING
CAS MOT-O
TU FG
SUP FG
INTERRUPT
TAPE PULSE
UP DOWN
CAP PULSE
TAPE END
ZERO OUT
ACCESS OUT
RESET SW
IC 1 COUNTER
DATA IN
DATA OUT
PAL/NTSC SELECT
LAP IN
PORT-E OUTPUT DATA
PORT-D COLON CONTROL OUT
START CONTROL OUT
CLOCK CONTROL OUT
Q1, 2 RESET PULSE
IC 2 DRIVER
PORT-A INPUT DATA
TAPE END INPUT DATA
START INPUT DATA
CLOCK INPUT DATA
PORT-F DIGIT CONTROL OUT
PORT-E LAP CONTROL OUT
PORT-C MINUS CONTROL OUT
PORT-D E SEGMENT CONTROL OUT
LAP
FILAMENT CURRENT GEN
LAP SW
RESET SW
DRUM
CAPSTAN
REEL
DRUM FF
REC, EE
DRUM SEARCH
DRUM MOTOR
REC
CAPSTAN MOTOR
X 1/5 SPEED
X 2 SPEED
DOWN
CTL PULSE
X10
CAPSTAN PULSE
REC LED
SEARCH SPEED
SUPPLY TENSION COMPENSATE
REEL LOADING
REEL REW
REEL FF
REEL STILL
SUPPLY REEL FG
TAKE-UP REEL FG
ACCESS
REEL UNLOADING
TAKE-UP TENSION COMPENSATE
REEL STOP
CAPSTAN SEARCH
CAPSTAN FG x 2 (1140Hz)
LONG STILL
NTSC 12 V
NTSC 12 V
PAL & SECAM 12 V
PAL, SECAM(H) OPEN for NTSC
P325
P326
P324
P341
P651
P319
P242
P239
P225
J211
J212
J202
P318
P241
P232
P234
P238
P257
P317
P316
P315
P314
P313
P312

3.2.24 System control timing chart

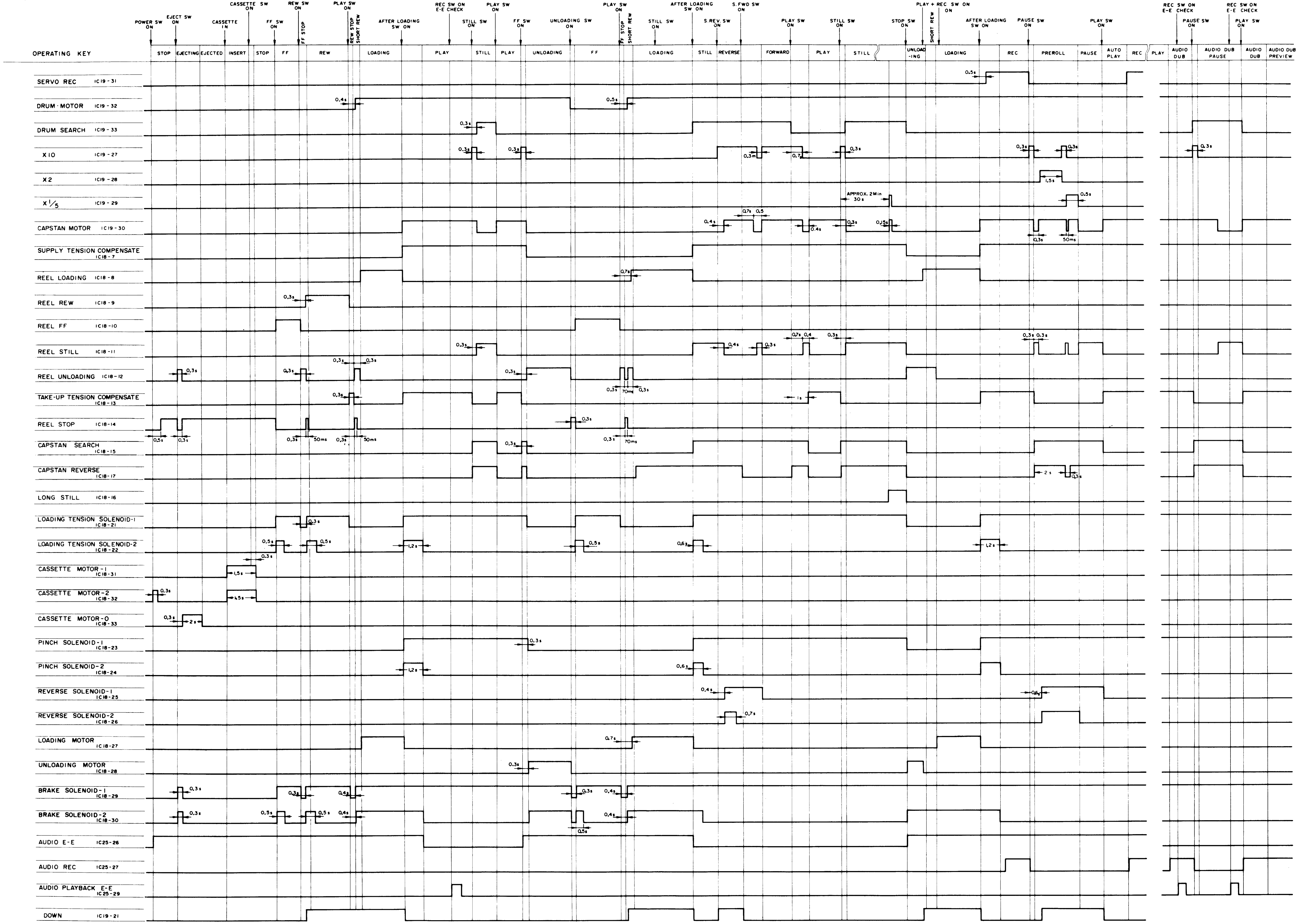

POWER SW ON
EJECT SW ON
CASSETTE IN
CASSETTE SW ON
FF SW ON
REW SW ON
FF STOP
PLAY SW ON
REW STOP
SHORT REW
AFTER LOADING SW ON
REC SW ON E-E CHECK
STILL SW ON
PLAY SW ON
FF SW ON
UNLOADING SW ON
PLAY SW ON
FF STOP
SHORT REW
STILL SW ON
AFTER LOADING SW ON
S.REV SW ON
S.FWD SW ON
PLAY SW ON
STILL SW ON
STOP SW ON
SHORT REW
PLAY + REC SW ON
AFTER LOADING SW ON
PAUSE SW ON
PLAY SW ON
REC SW ON E-E CHECK
PAUSE SW ON
REC SW ON E-E CHECK
PLAY SW ON
OPERATING KEY
STOP
EJECTING
EJECTED
INSERT
STOP
FF
REW
LOADING
PLAY
STILL
PLAY
UNLOADING
FF
LOADING
STILL
REVERSE
FORWARD
PLAY
STILL
UNLOADING
LOADING
REC
PREROLL
PAUSE
AUTO PLAY
REC
PLAY
AUDIO DUB
AUDIO DUB PAUSE
AUDIO DUB
AUDIO DUB PREVIEW
SERVO REC IC19-31
DRUM·MOTOR IC19-32
DRUM SEARCH IC19-33
X10 IC19-27
X2 IC19-28
X1/5 IC19-29
CAPSTAN MOTOR IC19-30
SUPPLY TENSION COMPENSATE IC18-7
REEL LOADING IC18-8
REEL REW IC18-9
REEL FF IC18-10
REEL STILL IC18-11
REEL UNLOADING IC18-12
TAKE-UP TENSION COMPENSATE IC18-13
REEL STOP IC18-14
CAPSTAN SEARCH IC18-15
CAPSTAN REVERSE IC18-17
LONG STILL IC18-16
LOADING TENSION SOLENOID-1 IC18-21
LOADING TENSION SOLENOID-2 IC18-22
CASSETTE MOTOR-1 IC18-31
CASSETTE MOTOR-2 IC18-32
CASSETTE MOTOR-0 IC18-33
PINCH SOLENOID-1 IC18-23
PINCH SOLENOID-2 IC18-24
REVERSE SOLENOID-1 IC18-25
REVERSE SOLENOID-2 IC18-26
LOADING MOTOR IC18-27
UNLOADING MOTOR IC18-28
BRAKE SOLENOID-1 IC18-29
BRAKE SOLENOID-2 IC18-30
AUDIO E-E IC25-26
AUDIO REC IC25-27
AUDIO PLAYBACK E-E IC25-29
DOWN IC19-21
APPROX. 2 Min
30 s
0.3s
0.4s
0.5s
0.7s
1.5s
1.2s
0.6s
2s
50ms
70ms
1s

Fig. 3-29

BR-6400 SERVO MECHANICAL TIMING CHART

3-26

3.3 SERVO CIRCUIT

3.3.1 Drum servo circuit

Refer to block diagram Fig. 3-40.

1. Purpose

The drum servo circuit controls rotation speed and phase of the video heads in the Recording and Playback modes.

Control signal
- Speed: Frequency generator (FG) pulses are produced by DD motor rotation. These are detected and used for correcting rotational speed error.
- Phase: Pulse generator (PG) magnets are mounted on the rotor of the DD motor. These are detected to produce the drum pulse used for correcting the rotational phase of the video heads. During recording, the reference signal is obtained from the vertical sync component of the input video signal. In Playback, the reference is derived either from an externally supplied sync signal or from an internal crystal oscillator.

Relationship between the comparison and reference signals which control rotating speed and phase of the video heads in the Recording and Playback modes, is summarized in Table 3-10.

Mode Control signal	Signal	Recording	Playback
Speed	Reference	Reference Voltage	Reference Voltage
	Comparison	FG (1600 Hz)	FG (1600 Hz/1920 Hz)
Phase	Reference	VIDEO IN	EXT. SYNC(EXT) X'TAL (INT)
	Comparison	DRUM FF (PULSE GEN HEAD)	DRUM FF (PULSE GEN HEAD)

Table 3-10 Drum servo control signal

2. Speed control system

1) Speed control circuit

This circuit converts frequency variation produced by motor rotating error into a control voltage for regulating the motor speed.

Q40 and Q41 amplify the FG (1600 Hz) singal obtained from the drum motor and apply it as waveform (a) to an additional amplifier at pin 14 of IC6. This yields waveform (b) which goes to flip-flop FF-2 and signal (c) triggers monostable multivibrator MM-5. Refer to the Fig. 3-30.

The output of FF-2 is also applied to an inverter to produce signal (d). This is AND gated with MM-5 output (e) at GATE 3 to result in pulse (f) which corresponds with the speed error.

At the trapezoid circuit, a trapezoidal pulse with rise time constant corresponding to the width of pulse signal (f) is formed. GATE 4 circuit gates this with signal (e) of MM-5 to result in sampling pulse (g).

Sampling pulse (g) and the trapezoidal pulse are sampled by the SAMPLING & HOLD circuit and C51 holds the peak voltage of the trapezoidal pulse. The resulting error voltage (j) is applied to a twin-T filter, which possesses very sharp cutoff characteristics at a certain frequency.

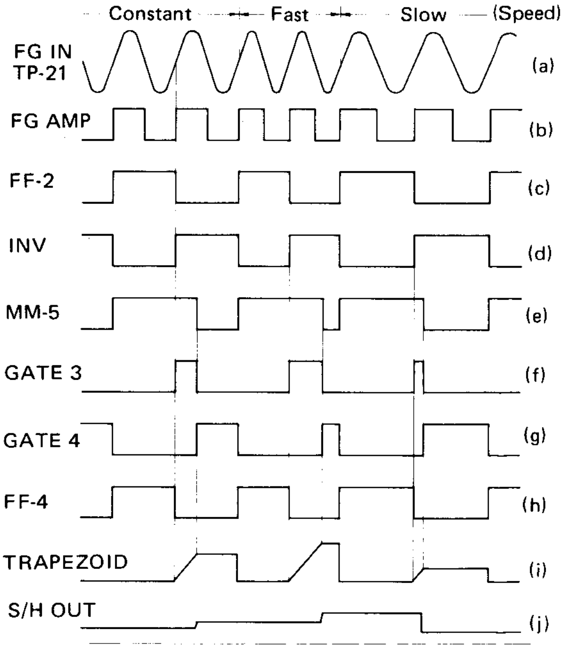


Fig. 3-31 Speed control timing chart

As shown in the speed control timing chart, Fig. 3-31, when the rotating speed of the motor is faster, the FG pulse interval shorter and the error voltage higher.
And also slower the motor speed, the FG pulse interval longer and the error voltage lower.

Following is the summary of the above relations:

Rotation of drum motor	Faster than normal	Slower than normal
FG signal interval	Shorter	Longer
Detected voltage	Higher	Lower
Amplifier voltage	Lower	Higher
Motor current	Decrease	Increase
Rotation of drum motor	Becomes slower	Becomes faster

Table 3-11 Speed control

2) TWIN-T, SF, AMP and electric SW circuits

After rejection of distortion, which caused by irregularity of rotation at each revolution of them drum motor, with TWIN-T filter composed of C56, 57 an R155 through R157 where 5 Hz components are dropped out, the error signal is converted impedance by source follower Q39 and applied to pin 6 and 3 of IC5 with low output level.

After applied to pin 6 of IC5 and amplified by inverting amplification circuit, the error signal is fed to MDA and controls motor current. This means if rotating speed of the motor becomes slower than the constant speed, the error signal voltage becomes lower and pin 6 voltage of IC5 becomes lower, then pin 7 voltage of IC5 becomes higher and this higher voltage makes the motor rotate faster because of increasing motor current.

On the contrary, if the motor speed becomes faster, the error voltage becomes higher, pin 6 voltage of IC5 higher, output of IC5 lower, motor current decrease and the motor speed becomes slow.

As speed control is performed by repeating this operation, the error voltage becomes constant at any time and the motor speed becomes constant.

The error voltage is, then, applied to pin 6 of IC5 as phase control signal.

Amplifier composed of pins 1, 2 and 3 of IC5 operates only at REV of Search mode. Pin 3 output of IC5 is not applied to MDA as Q10 is normally ON.

Motor control electronic SW circuit composed of Q5, Q6 and Q10 is controlled to ON or OFF by a command from the system control circuit.

That is, when a high voltage is applied to terminal J221 (15) (DRUM MOTOR) through the system control circuit, Q5 becomes ON and both Q6 and Q10 becomes OFF due to voltage drop of Q5 collector, but Q10 becomes ON or OFF in accordance with pin 7 output voltage of IC5.

Therefore, pin 7 of IC5 normally outputs a voltage and the output voltage is applied to the motor through MDA, then the motor rotates.

When a low voltage is applied to the terminal J221 (7), Q5 becomes OFF, Q6 and Q10 ON due to high voltage of Q5 collector and no voltage is supplied to the motor as pin 7 output of IC5 is grounded, then the motor does not rotate.

In Playback mode (NTSC only) high voltage is applied to the terminal J222 (1) (NTSC 12 V IN)

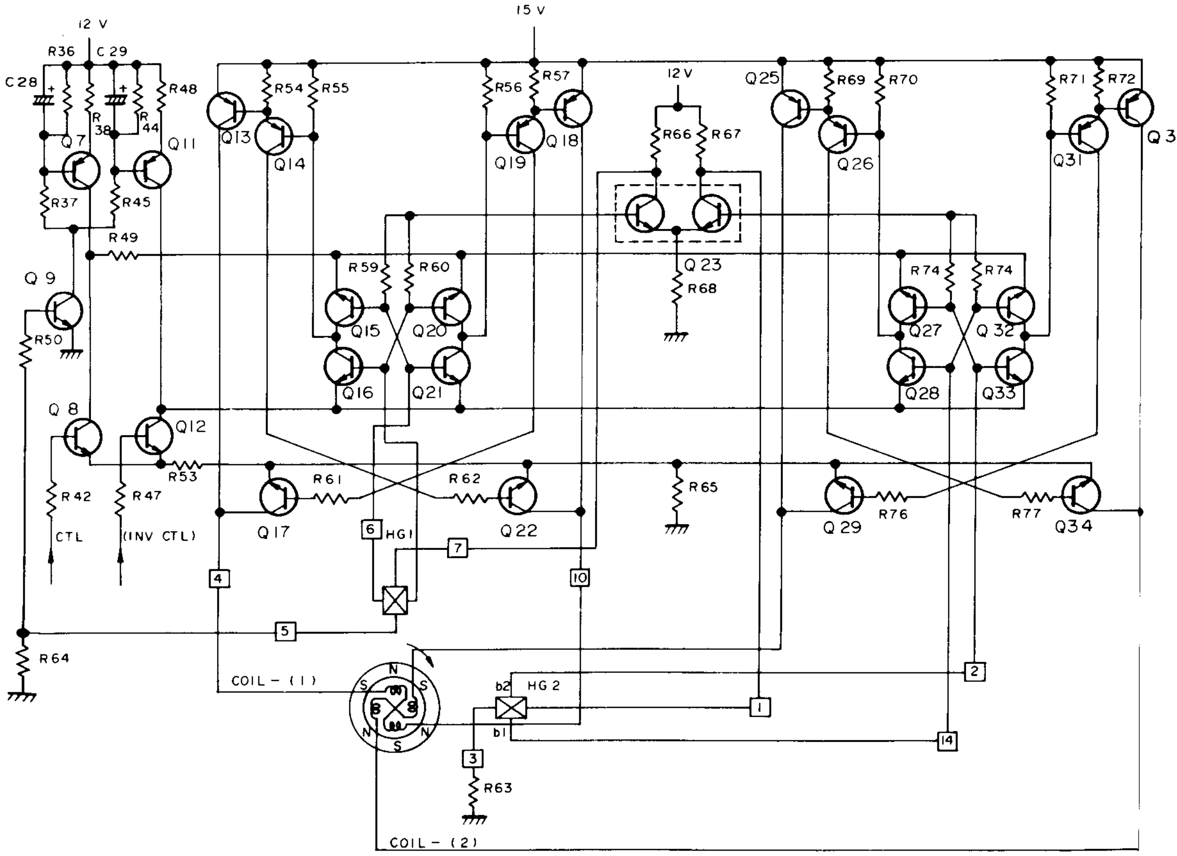

12 V
15 V
R36
C29
C28
R48
R38
R44
Q7
Q11
R37
R45
R49
Q9
R50
Q8
Q12
R53
R42
R47
CTL
(INV CTL)
R54
R55
Q13
Q14
R56
R57
Q19
Q18
R59
R60
Q15
Q20
Q16
Q21
R61
R62
Q17
Q22
6
HG1
7
4
10
5
12V
R66
R67
Q23
R68
R65
Q25
R69
R70
Q26
R71
R72
Q30
Q31
R74
R74
Q27
Q32
Q28
Q33
Q29
R76
R77
Q34
2
1
14
R64
COIL - (1)
N
S
S
N
N
S
b2
HG 2
b1
3
R63
COIL - (2)

Fig. 3-32 MDA cicuit

by the mode select switch, and this high voltage turns on the electronic switches IC4 (pins 6, 8–12) and IC11 (pins 1, 2, 13). Accordingly, the time constant of MM-5 becomes shorter and the slant of the trapezoidal waveform is turned round. As a result, the speed of drum rotation becomes faster.
On the other hand, error voltage is sent to IC5 (MIX AMP) via the Twin-T filter (C73–75, R159–161) which removes the 30 Hz component.

3) Motor drive circuit

- Hall element
This a type of semiconductor which utilizes the Hall effect. As illustrated in Fig. 3-33, when control current Ic flows through a conductor and magnetic flux B is applied perpendicularly, voltage V_H becomes produced perpendicularly (3-dimentionally) to both Ic and B. This relationship can be expersssed by the formula:

$$V_H = R_H \times \frac{I_c \times B}{d}$$

In the above, R_H = material constant (Hall coefficient)
d = conductor thickness

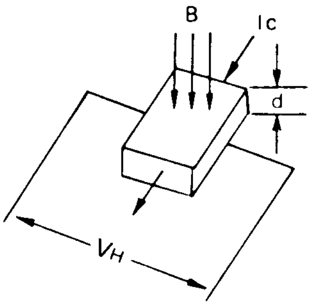


Fig. 3-33 Hall element

- Operation principles of MDA
If Play mode is selected, Q12 is OFF (if REV is selected; ON) and line connected among the collector of Q12 and emitters of Q16, 21, 28 and 33 are power supply voltage.

(1) Suppose with the Hall element HG1 and N pole of the rotor magnet are located in face-to-face position as shown in the schematics, negative voltage is produced at al side of the HG1.

In this case Q20 is OFF, Q18, and Q19 are also OFF and Q15 is ON because of producing a positive voltage at a-2 side of the HG1.

Therefore, Q13, Q14 and Q22 are ON, current flows through Q13, coil (1), Q22, R65 and the ground and the rotor rotates to the direction of the arrow indicated in the schematics due to coil current and magnetic flux of the magnet.

(2) If the rotor rotates 30°, from the illustrated position, HG2 and S pole of the rotor magnet are located in face-to-face position and a positive voltage is produced at b-2 side of the HG2, then Q27 Q26, Q25 and Q34 are OFF.

Current flows through Q30, coil (2), Q29, R65 and the ground, and the ground, and the rotor rotates further to the same direction.

The motor keeps rotation toward constant direction, because the switching between the Hall elements and the rotor magnet continues methodically.
The other side, rotation control of the drum motor is performed by phase (speed) control voltage which applied to the bases of Q8 and Q12, and the horizontal synchronizing signal frequency is corrected by changing rotation speed of the drum motor at Search mode for this mode for this model.

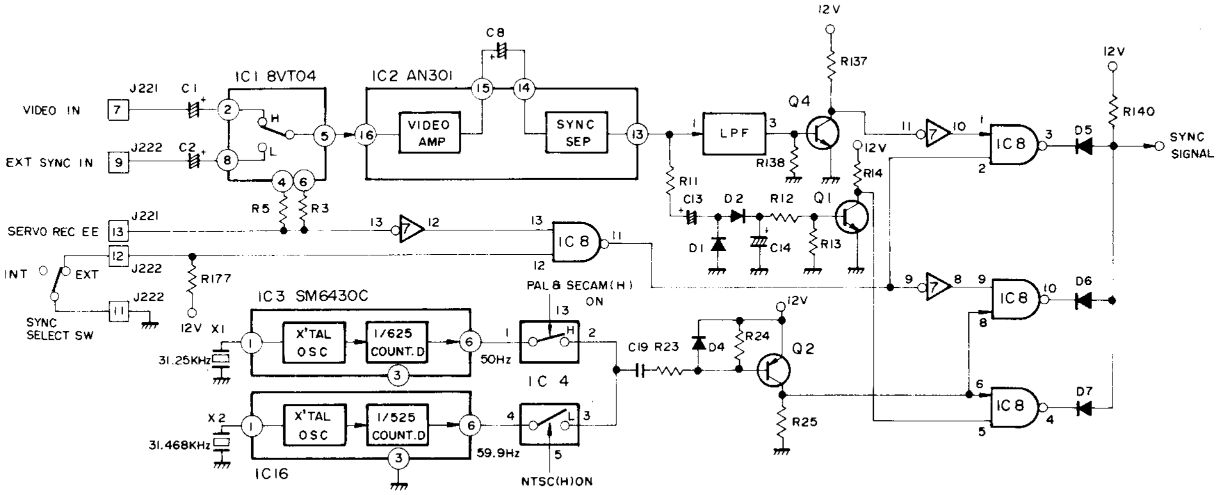
As the control voltage is applied to Q8 base and not applied to Q12 base normally, Q12 is OFF. However, at the following condition Q12 is ON and Q8 is OFF:
When mode is selected from FWD to PLAY at search period, the motor is rotated reversely for a moment for breaking purpose and quickly returned to the normal rotation speed.

That is as described in the above 10, Q15 which is ON, becomes OFF as a result of ON of Q8 and Q21 becomes ON due to ON of Q12. According to these operations Q13, P14 and Q22 become OFF and Q18, Q19 and Q22 ON.

Therefore, the current which flows in the coil (1) changes to the opposite direction of the above 1) and gives reverse rotational torque to the motor.

3. Phase control system

1) Reference signal


VIDEO IN
EXT SYNC IN
SERVO REC EE
INT
EXT
SYNC SELECT SW
J221
J222
C1
C2
7
9
13
12
11
IC1 8VT04
IC2 AN301
C8
VIDEO AMP
SYNC SEP
H
L
R5
R3
R177
12V
IC3 SM6430C
X1
31.25KHz
X'TAL OSC
1/625 COUNT.D
50Hz
X2
31.468KHz
1/525 COUNT.D
59.9Hz
IC16
IC 4
PAL & SECAM(H) ON
NTSC(H)ON
IC8
LPF
Q4
R137
R138
R11
C13
D2
R12
Q1
D1
C14
R13
R14
C19
R23
D4
R24
Q2
R25
D5
D6
D7
R140
SYNC SIGNAL

1/525 DIVI. – PIN③ : LOW
1/625 DIVI. – PIN③ : HIGH or OPEN

Fig. 3-34 Sync select circuit

A. In a case of existing VIDEO IN signal at Recording mode (VIDEO IN)

If REC mode is selected, a signal is applied to the terminal J222-(13) by a command from the system control circuit. This signal provides the following circuit operation:

Voltages of pins 4 and 6 of IC1 and pin 13 of IC7 are higher, pin 12 voltage of IC7 lower, pin 13 voltage of IC8 lower, pin 11 voltage of IC8 higher, voltages of pin 9 of IC7 and pin 2 of IC8 higher, pin 8 voltage of IC7 lower, then pin 10 voltage of IC8 higher and D6 is OFF.

On the other hand, VIDEO IN input signal is outputted to pin 5 of IC1 because of higher voltage setting of pins 4 and 6 of IC1. The input signal is amplified enough to drive the synchronizing operator circuit, extracted the horizontal and the vertical synchronizing signal and applied to both LPF and synchronizing signal detector circuit.

The vertical synchronizing signal which is obtained through LPF circuit is applied to pin 1 of IC8 after amplified by Q4 and inverted by IC7. Therefore, only when two input voltages of NAND circuit are higher, output is obtained and the vertical synchronizing signal is outputted as a result of ON of D5.

The synchronizing signal in the synchronizing signal detector circuit is rectified by D1 and D2, rises base voltage of Q1, Q1 is ON, pin 5 voltage of IC8 is lower, pin 4 voltage of IC8 lower and D7 becomes cut off condition.

B. In case of not existing VIDEO IN signal at Recording moee (X'TAL)

At REC mode, a signal is applied to the terminal J221-(13) by a command from the system control circuit.

This signal provides the following circuit operation: Voltages of pins 4 and 6 of IC1 and pin 13 of IC7 are higher, pin 13 voltage of IC8 lower, pin 11 voltage of IC18 higher, voltages of pin 8 of IC7 and pin 9 of IC8 lower and pin 10 voltage of IC8 higher, then D6 is OFF.

As no signal exists at pin 5 of IC1 due to lack of VIDEO IN signal, Q4 and Q1 is OFF, Q4 collector voltage higher, voltages of pin 10 of IC7 and 1 of IC8 are lower, pin 3 voltage of IC8 higher and D5 is OFF.

On the other hand, 50 Hz signal makes D7 ON. Because 50 Hz signal is demultiplied from 31.25 kHz X'TAL OSC and applied to pin 6 of IC8 so that pin 5 voltage of IC8 can be higher followed by Q1 collector voltage higher.

This 50 Hz signal of D7 output is called the reference signal, which controls the drum motor.

C. In case of EXT position of SYNC SW at Playback mode (EXT SYNC)

At Play mode, the EXT SYNC input signal is outputted to pin 5 of IC1, because the terminal J-221-(13) voltage is lower in accordance with a command from the system control circuit and voltages of pins 4 and 6 of IC1 are lower.

The outputted EXT SYNC signal is applied to pin 1 of IC8 through VIDEO AMP circuit, SYNC SEP circuit, LPF, Q4 amplifier and IC7 invertor.

On the other hands, pin 12 voltage of IC8 is lower due to EXT position of SYNC SW and voltages of pins 11 and 2 of IC8 are higher.

Therefore, signals applied to pins 1 and 2 of IC8 are gated by IC8 during higher voltage period of both signals and the vertical synchronizing signal of EXT SYNC is outputted through D5.

D. In case of INT position of SYNC SW at Playback mode (X'TAL)

At Play mode, voltage of terminal J221-(13) is lower due to command from the system control circuit and voltages of pin 13 of IC7 and pin 13 of IC8 are higher. As SYNC SW is positioned INT, pin 12 voltage of IC8 is higher, pin 11 of IC8 lower, voltages of pin 8 of IC7 and pin 9 of IC8 higher, and pin 8 is applied to 50 Hz/60 Hz signal which is demultiplied from X'TAL OSC signal. Both signals applied to pins 8 and 9 of IC8 are gated and outputted through D6 is the reference signal for control the drum motor.

The other section of IC8 operates as follows:

Pin 2 voltage of IC8 is lower, pin 3 voltage of IC8 is higher and D5 is OFF.

Voltages of pins 4 and 6 of IC1 are lower and the EXT SYNC signal is outputted to pin 5 of IC1.

Finally Q1 is ON, Q1 collector voltage is lower, pin 4 voltage of IC8 higher and D7 is OFF.

A relation of synchronizing signal at each mode described above is summarized below:

INPUT SIGNAL		MODE	SYNC SW	REF
VIDEO IN	EXT SYNC			
–	–	–	–	X'TAL
○	–	REC	–	VIDEO IN
		P.B.	–	X'TAL
–	○	REC	–	X'TAL
		P.B.	EXT	EXT SYNC
			INT	X'TAL
○	○	REC	–	VIDEO IN
		P.B.	EXT	EXT SYNC
			INT	X'TAL

Table 3-12 Drum synchronization

2) Trapezoid circuit and CTL REC AMP circuit

The vertical synchronizing signal selected by the synchronizing selection circuit is fed to the recording playback switch after inverted twice and amplified by VSS AMP circuit.

The vertical synchronizing signal is devided into two systems through the switch selection which is always applied 12 V to select VSS AMP circuit.

In one system, 50 Hz vertical synchronizing signal is applied to MM4 circuit to convert it to the unsymmetric rectangular wave with a monostable multivibrator and after the signal is amplified by CTL REC AMP circuit and passed through electronic switch, the signal is fed to the capstan servo circuit from the terminal J222-(3) as a REC CTL signal.

In the other system, the vertical synchronizing signal is fed to FF2 circuit to form 25 Hz symmetric rectangular wave and converted to a trapezoidal wave by the trapedoid circuit. One of the trapezoidal wave is sent to the capstan servo circuit through pin 18 of IC6 and the terminal J222-(5).

The other is applied to the sampling and hold circuit as a reference signal on phase comparison.

3) Comparison signal generating circuit

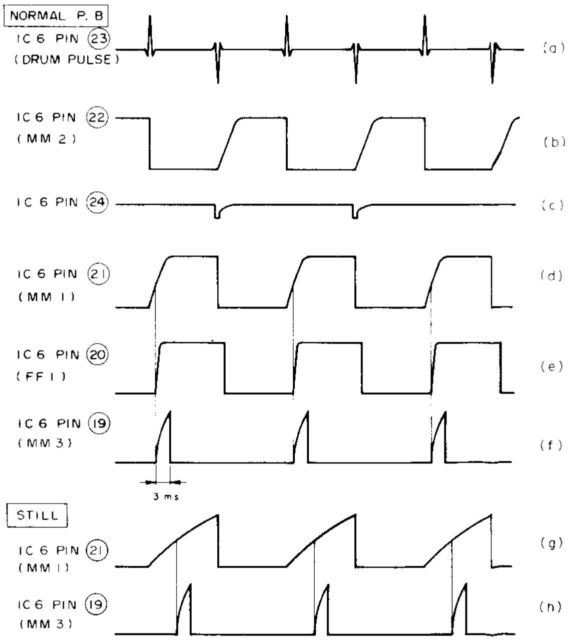


Fig. 3-35 Comparison signal timing

Comparison signal is generated by a magnet mounted on the same rotating shaft of the head and the pulse generating head. Correction of mechanical misalignment of the head caused at mounting is made by adjusting the raise time of the monostable multivibrator.

And also, SW POINT position is corrected by matching the mode of NORMAL (REC/P.B) or SEARCH (STILL, S-REV, S-FWD) by means of switching the heads. 4 heads of this model can perform the above.

That is, at normal mode, the terminal J221-(14) voltage is lower, pin 2 voltage of IC7 higher, voltages of pins 6 and 12 of IC10 higher, each electronic switch of IC10 is ON and each P.B. SW PHASE for CH-1 or CH-2 is adjusted by R95 or R101 respectively.

At Search mode, as the terminal J221-(14) voltage is higher owing to a command from the system control circuit, voltages of pin 2 of IC7 and pins 6 and 12 of IC10 are lower, each electronic switch of IC10 is OFF and each P.B. SW PHASE for CH-1 or CH-2 is adjusted by R116 & R120 respectively.

The monostable multivibrator circuit changes phase of 25 Hz input, shifts phase of FF-1 circuit and generates 25 Hz symmetric rectangular wave. One of the 25 Hz signal is fed to MM-3 circuit via GATE-1 circuit for trigering the MM-3.

Output of MM3 with TO SEC delayed signal is applied to GATE-2 circuit and output of GATE-2 is sent to the sampling and hold circuit.

The other 25 Hz signal is inverted by Q35 and applied to the video circuit and the system control circuit from the terminal J221-(11) as a drum FF signal.

One other FF-1 output signal branched parallel to the Q35 is applied to the V. pulse generator, where pseudo vertical pulses are formed and sent to the video circuit from the terminal J221-(9) as a V. pulse signal.

In Playback mode of the NTSC system, of course, the phase of switching pulse is corrected by functioning of the electronic switch.

4) Sampling and hold circuit, electronic switch, SF and limitter circuits

This circuit converts the difference of phase between the reference signal and the comparison signal, controls rotation of the drum motor and corrects phase shift of the video head.

Here, the reference signal means a trapezoidal wave generated by the vertical synchronizing signal of VIDEO IN signal at the recording, but at the playback, a trapezoidal wave generated by the vertical synchronizing signal of VIDEO IN, EXT SYNC or X'TAL signal, and the comparison signal means the head rotating detecting pulse.

Namely, the slope voltage of leading edge in a trapezoidal wave is sampled by negative pulses applied from GATE-2 circuit, converts phase error to voltage change and applied to pin 5 of IC5 non-inverting amplifier through pin 10 of IC11 electronic switch and Q38 is a limiter circuit and keeps the minimum emitter voltage of 2.6 V DC to avoid that IC amplifier for REV of pins 1 through 3 continues ON condition even if the phase error voltage becomes extremely small, with any reason.

At Search mode, as the terminal J221-(14) (DRUM SEARCH) voltage changes from low to high due to a command from the system control circuit, pin 12 voltage of IC11 is lower, namely, this switch is OFF and the phase control loop becomes OFF. Therefore, the control correction voltage (DRUM SEARCH VOLT) generated at the capstan servo circuit is applied to the drum motor via pin 9 of IC11 electronic switch.

DRUM SEARCH VOLT generated at the capstan servo circuit is as shown below:

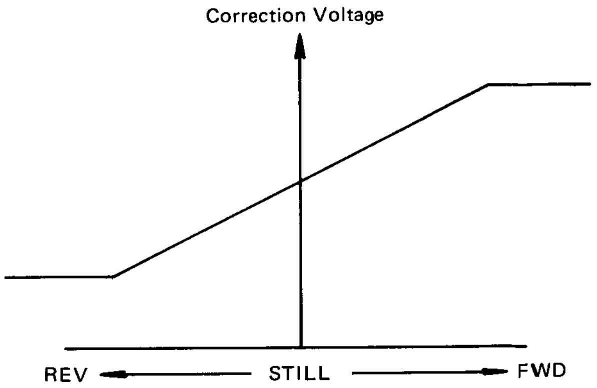


Fig. 3-36 Drum search voltage

5) Vertical pulse generator circuit

During the Search FWD/REV and Still modes, each video head traces two or more tracks simultaneously, producing FM signal loss. If this loss occurs in the vertical sync period, vertical lock of the TV receiver could be disturbed. To avoid this problem, the V pulse is added to the vertical blanking period of the playback video signal.

Drum flip-flop signal is converted to 50 Hz pulse signal by means of charge and discharge of C24 connected to the input terminal of the exclusive OR gate of IC14 (pins 5 and 6). This pulse signal is supplied to pin 2 of IC13 which composes a monostable multivibrator. The pin 4 of IC13 is

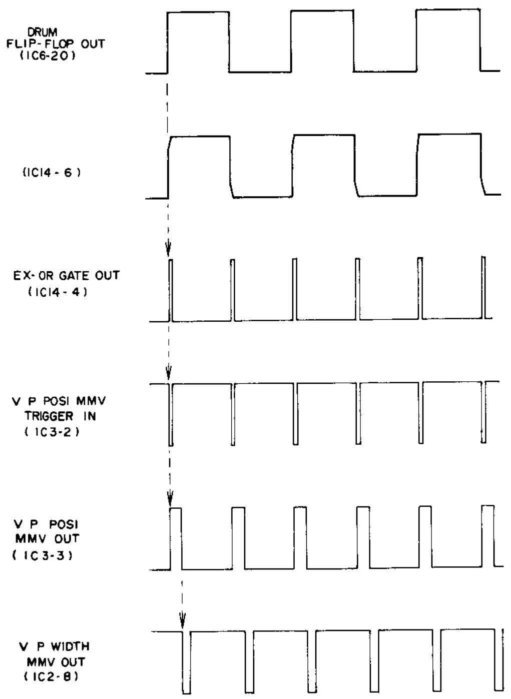

DRUM FLIP-FLOP OUT (IC6-20)
(IC14-6)
EX-OR GATE OUT (IC14-4)
V P POSI MMV TRIGGER IN (IC3-2)
V P POSI MMV OUT (IC3-3)
V P WIDTH MMV OUT (IC2-8)

Fig. 3-37 V pulse generator

the reset terminal. When this terminal has low potential, C22 is held in discharging condition by the current from pin 7 of IC13, while pin 3 (OUTPUT) of IC13 holds low level.

DRUM SEARCH (High) IN signal from the Syscon board is applied to terminal J221-(14) in Search and Still modes. When the V. PULSE switch is in ON condition, the gate output of pin 10 of IC14 becomes high level. In this state the monostable multivibrator of IC13 is triggered by the input signal through pin 2 and turns out positive 50 Hz signal to pin 3. R27 is provided for adjusting V. PULSE position. This signal is supplied to the monostable multivibrator of IC2 which determines V. PULSE width after passing through the gate of IC14 (pins 11–13). The output signal from pin 8 of IC2 of the monostable multivibrator is supplied to the Y board through terminal J221-(9) after passing through the inverter of Q43. The signal once becomes resultant playback video signal in the Y board and finally becomes video signal.

4. Operation of the drum servo at the shuttle search

Forward search (FWD) or reverse search (REV) can be performed at tape set condition on the rotating head drum. In other words, tape can be searched both forward and reverse ten times faster than normal speed during the Playback mode and seen pictures corresponding to the search speed on a TV receiver.

This faster speed search is called as the shuttle search.

1) Relation between tape patterns and the playback head FM output

When the shuttle search; ten times faster forward or reverse winding during the Playback mode is performed, both CH-1 and CH-2 heads scan each 10 tracks, which are recorded as shown in Fig. (1).

The tracks are recorded with ±6° azimuth angle. However, this model contains a separate pair of video heads for the Slow, Still and Search modes. During Still and Search, since the azimuth of these special heads is the same as the recorded CH-2, the CH-1 track in effect becomes a guard band in a manner similar to a 3/4" VCR.

Playback head FM output pattern as shown in Fig. (2) is shaped as a rhomb because of big difference of the head such angle from normal playback. This pattern without output at the joint of each track gives noise in the picture.

In VHS models without this feature two different fields are played back in the Still mode, resulting in flicker due to the slightly different picture information of each field. However, the "field still" feature of this model plays back only the CH-1 track in the Still and Search modes, eliminating this source of flicker.

2) Error and correction of the horizontal synchronizing frequency and the vertical synchronizing frequency

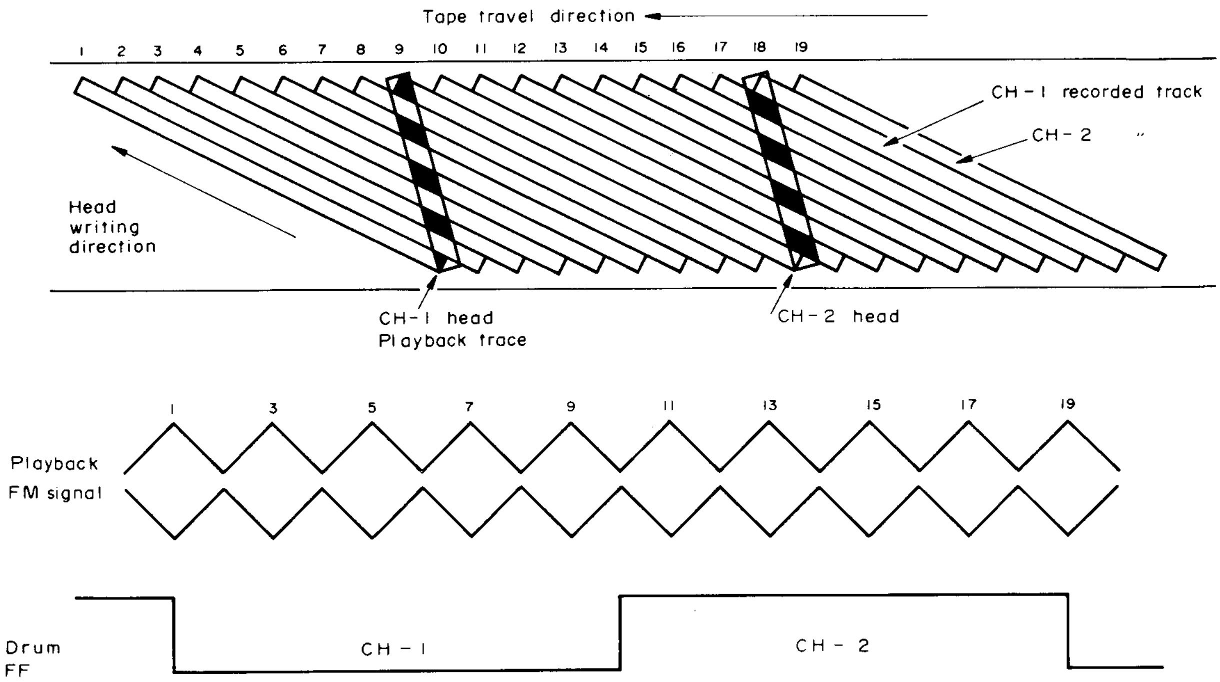
At the shuttle search mode, relative speed of FWD and REV between the video head and the tape varies in reverse direction corresponding to speed change. As the directions of tape run and head rotation are the same at FWD, the faster the speed, the slower the relative speed, the horizontal synchronizing frequency is lower.

On the other hand, at REV the relative speed is higher and the horizontal synchronizing frequency is higher, because the directions of the tape run and the head rotation are reverse.

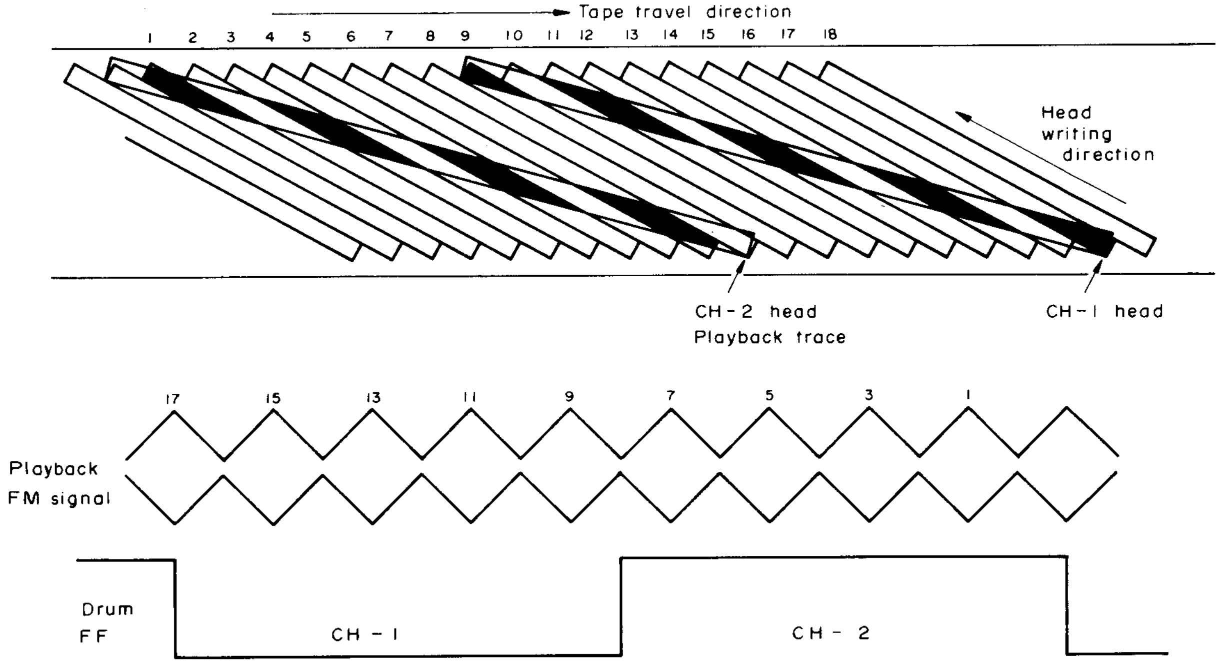
Each relative speed change is approximately –5% for FWD and approximately 6% for REV, but the horizontal synchronization of TV receiver is not locked without any corrective action.

In accordance with the necessity of corrective action, the rotation speed of the head increases approximately 5% for FWD and decreases approximately 6% for REV.

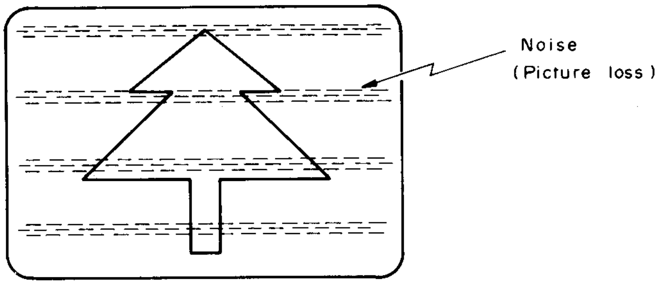
Regarding the vertical synchronizing signal, no corrective action is required because of wide range vertival synchronizing characteristic of TV receiver.


Tape travel direction
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
CH - 1 recorded track
CH - 2 "
Head writing direction
CH - 1 head Playback trace
CH - 2 head
1 3 5 7 9 11 13 15 17 19
Playback FM signal
Drum FF
CH - 1
CH - 2

(a) Search FF mode


Tape travel direction
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Head writing direction
CH - 2 head Playback trace
CH - 1 head
17 15 13 11 9 7 5 3 1
Playback FM signal
Drum FF
CH - 1
CH - 2

(b) Search REW mode


Noise (Picture loss)

(c) Playback picture in Search FF/REW mode

Fig. 3-38 Tape pattern and FM in search mode

The pseudo vertical pulses are inserted at the shuttle search mode similarly to Slow and Still modes so that the vertical synchronization of the receiver may not be disturbed by noises and so that vertical fluctuation may reduce as much as possible.

3) Operation of the correction circuit

A. S-REV mode

In the S-REV mode, pins 11 and 10 of IC11 are OFF, the fixed voltage generated at the capstan servo circuit is applied to the terminal J222 (7) (DRUM SEARCH VOLT) and applied to source follower Q37 via pins 8 and 9 of IC11, then fed to the motor through pins 5 and 7 of IC5 and the motor drive amplifier. Voltage applied to the motor is lower than normal mode and the rotation speed of the motor reduces. Relative speed is reduced approximately 6% comparing with the normal mode.

When the remote controller is used, the motor is controlled as same manner by adding correction voltage corresponding to the related relative speed.

B. S-FWD mode

As same as S-REV, the phase control system does not operate, but the fixed voltage generated at the capstan servo circuit is applied to the terminal J222 (7) (DRUM SEARCH VOLT) and fed to the motor through pins 8 and 9 of IC11, source follower Q37, pin 5 of IC5 non-inverting amplifier and the motor drive amplifier.

Voltage applied to the motor is higher than normal mode and the rotation speed of the motor increases. Relative speed is increased approximately 5% comparing with the normal mode.

When the remote controller is used, the motor is controlled as same manner by adding correction voltage corresponding to the related relative speed.

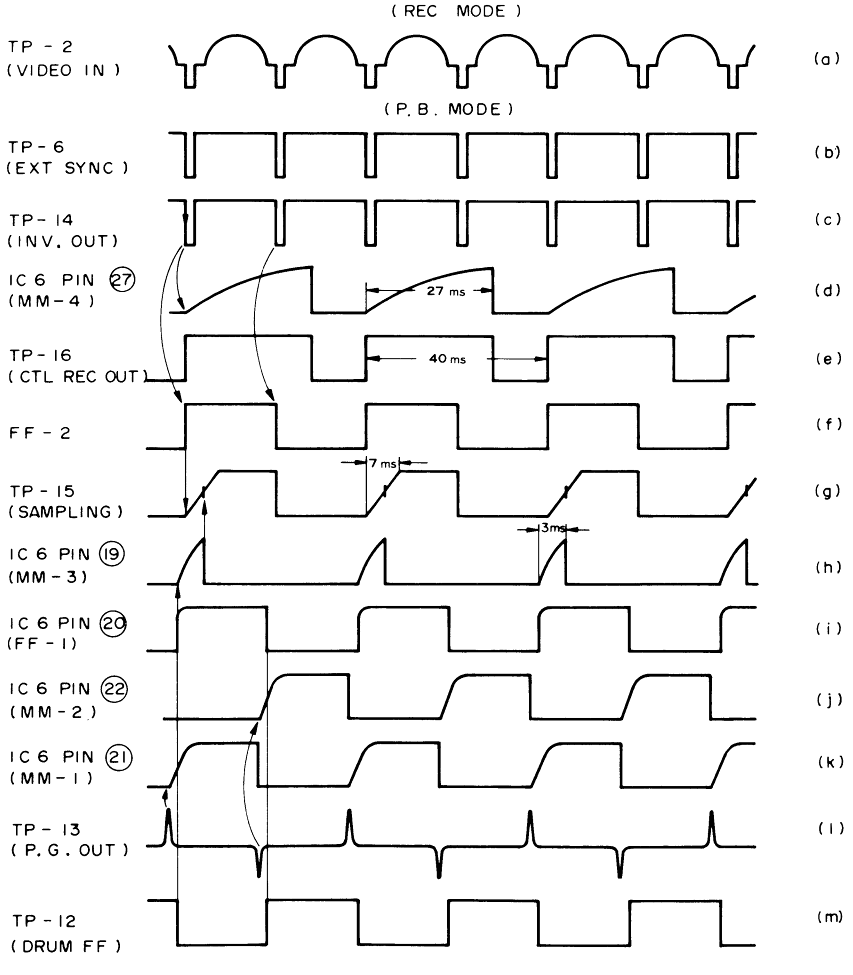
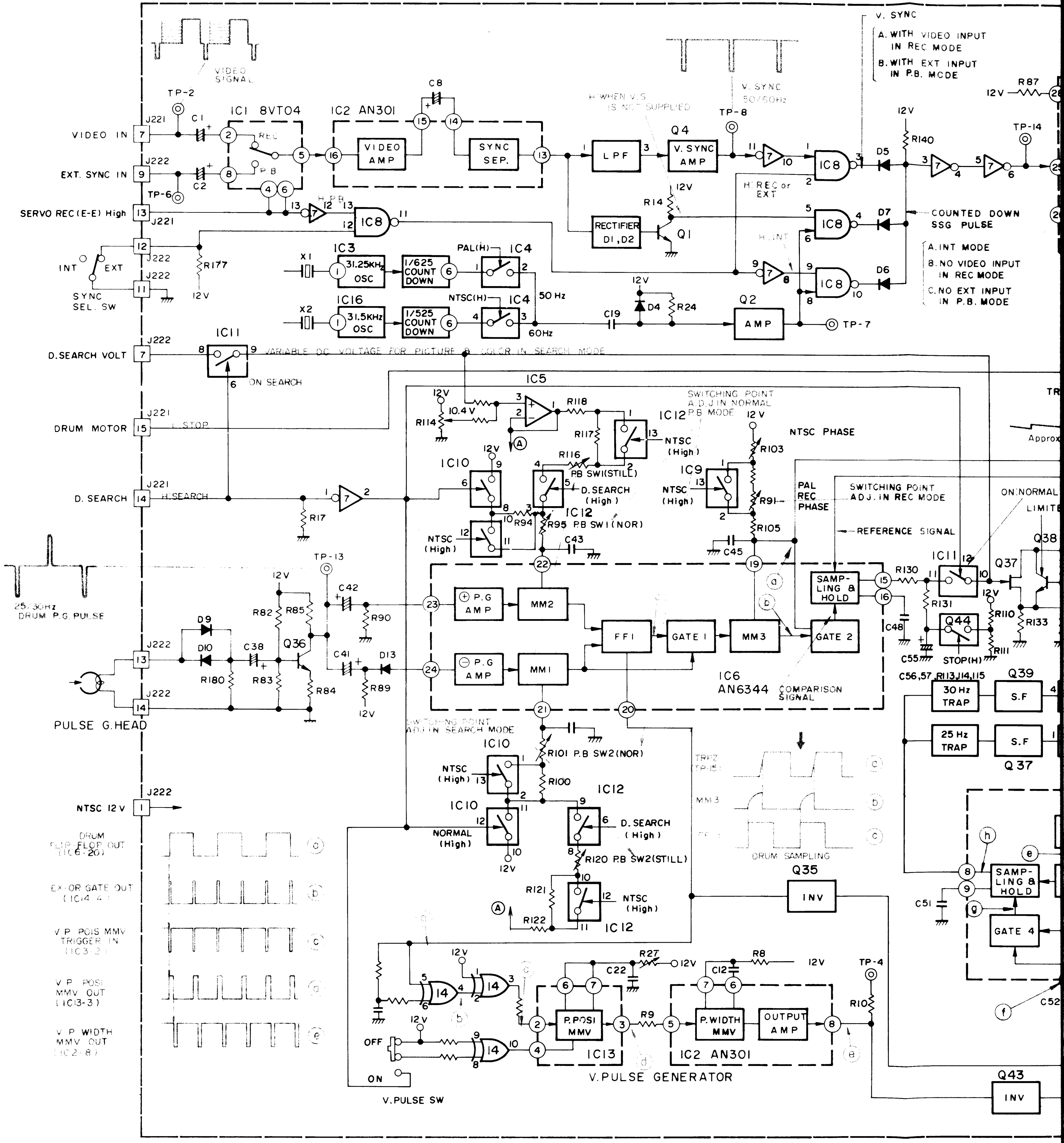


Fig. 3-39 Drum servo timing chart



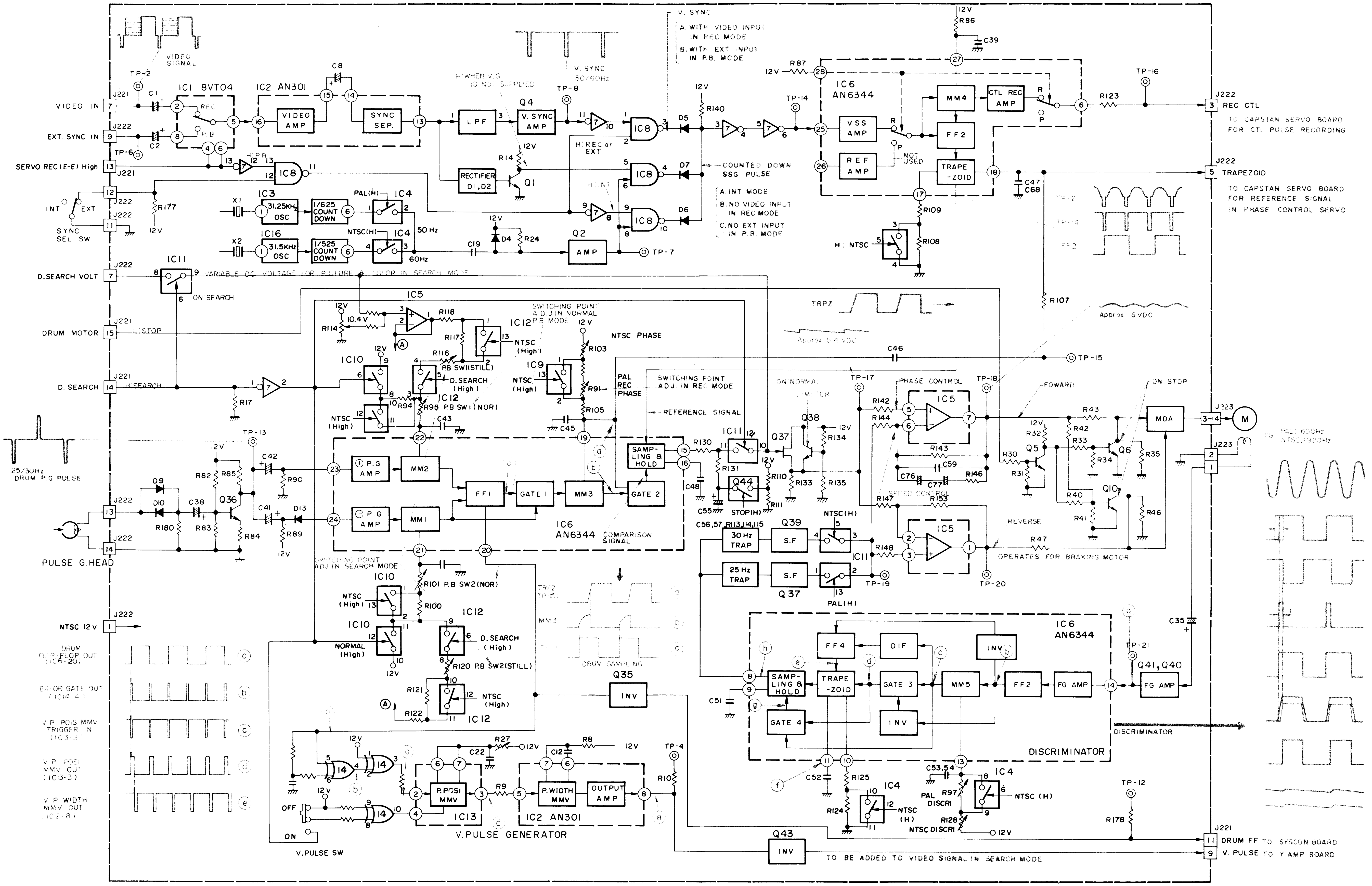
VIDEO SIGNAL
TP-2
J221
C1
C2
C8
IC1 8VT04
IC2 AN301
REC
P.B
VIDEO AMP
SYNC SEP.
VIDEO IN
EXT. SYNC IN
TP-6
SERVO REC (E-E) High
INT
EXT
SYNC SEL SW
R177
12V
J222
LPF
Q4
V. SYNC AMP
H: WHEN V.S IS NOT SUPPLIED
V. SYNC 50/60Hz
TP-8
V. SYNC
A. WITH VIDEO INPUT IN REC MODE
B. WITH EXT INPUT IN P.B. MODE
R87
12V
R140
TP-14
D5
D7
D6
IC8
H: P.B
H: REC or EXT
H: INT
R14
Q1
RECTIFIER D1, D2
COUNTED DOWN SSG PULSE
A. INT MODE
B. NO VIDEO INPUT IN REC MODE
C. NO EXT INPUT IN P.B. MODE
X1
X2
IC3
31.25KHz OSC
1/625 COUNT DOWN
PAL(H)
IC4
IC16
31.5KHz OSC
1/525 COUNT DOWN
NTSC(H)
50 Hz
60Hz
C19
D4
R24
Q2
AMP
TP-7
IC11
D. SEARCH VOLT
VARIABLE DC VOLTAGE FOR PICTURE @ COLOR IN SEARCH MODE
ON SEARCH
DRUM MOTOR
L: STOP
IC5
10.4V
R114
R118
R117
SWITCHING POINT ADJ. IN NORMAL PB MODE
IC12
NTSC (High)
NTSC PHASE
R103
IC10
IC9
R116
PB SW1(STILL)
D. SEARCH (High)
NTSC (High)
R94
R95 PB SW1 (NOR)
R91
R105
C43
C45
PAL REC PHASE
SWITCHING POINT ADJ. IN REC MODE
REFERENCE SIGNAL
ON: NORMAL
LIMITE
D. SEARCH
H: SEARCH
R17
TP-13
C42
R82
R85
R90
D9
D10
C38
Q36
C41
D13
R180
R83
R84
R89
25/30Hz DRUM P.G. PULSE
PULSE G. HEAD
⊕ P.G AMP
⊖ P.G AMP
MM2
MM1
FF1
GATE 1
MM3
GATE 2
SAMP-LING & HOLD
IC6 AN6344
COMPARISON SIGNAL
R130
R131
R110
R133
C48
Q44
R111
C55
STOP(H)
C56,57 R113,114,115
Q37
Q38
Q39
30 Hz TRAP
25 Hz TRAP
S.F
SWITCHING POINT ADJ. IN SEARCH MODE
R101 P.B SW2(NOR)
R100
NTSC 12V
NORMAL (High)
R120 P.B SW2(STILL)
R121
R122
DRUM FLIP FLOP OUT (IC6-20)
EX-OR GATE OUT (IC14-4)
V.P. POIS MMV TRIGGER IN (IC13-2)
V.P. POSI MMV OUT (IC13-3)
V.P. WIDTH MMV OUT (IC2-8)
DRUM SAMPLING
Q35
INV
C51
GATE 4
TP-4
R27
R8
C22
C12
R9
R10
P. POSI MMV
P. WIDTH MMV
OUTPUT AMP
IC13
IC2 AN301
V. PULSE GENERATOR
OFF
ON
V. PULSE SW
Q43
INV
C52

Fig. 3-40 Drum servo block diagram

does
t the
minal
ed to
ource
plifier

rmal
r in-
ately

tor is
ction
peed.



VIDEO SIGNAL
TP-2
VIDEO IN
J221
EXT. SYNC IN
J222
TP-6
SERVO REC(E-E) High
INT
EXT
SYNC SEL. SW
D.SEARCH VOLT
DRUM MOTOR
D. SEARCH
NTSC 12 v
PULSE G.HEAD
25/30Hz DRUM P.G. PULSE
IC1 8VT04
REC
P.B
IC2 AN301
VIDEO AMP
SYNC SEP.
C8
C1
C2
R177
12V
IC3
X1
31.25KHz OSC
1/625 COUNT DOWN
PAL(H)
IC4
IC16
X2
31.5KHz OSC
1/525 COUNT DOWN
NTSC(H)
50 Hz
60Hz
IC8
H:P.B
H:WHEN V.S IS NOT SUPPLIED
V. SYNC 50/60Hz
TP-8
LPF
Q4
V. SYNC AMP
RECTIFIER D1,D2
R14
Q1
H:REC or EXT
H:INT
D5
D7
D6
R140
V. SYNC
A. WITH VIDEO INPUT IN REC MODE
B. WITH EXT INPUT IN P.B. MODE
COUNTED DOWN SSG PULSE
A. INT MODE
B. NO VIDEO INPUT IN REC MODE
C. NO EXT INPUT IN P.B. MODE
C19
D4
R24
Q2
AMP
TP-7
R87
TP-14
IC6 AN6344
VSS AMP
REF AMP
NOT USED
MM4
CTL REC AMP
FF2
TRAPE -ZOID
R86
C39
R123
TP-16
J222
REC CTL
TO CAPSTAN SERVO BOARD FOR CTL PULSE RECORDING
TRAPEZOID
TO CAPSTAN SERVO BOARD FOR REFERENCE SIGNAL IN PHASE CONTROL SERVO
C47 C68
R109
R108
H: NTSC
TP-2
TP-14
FF2
TRPZ
Approx 5.4 VDC
Approx 6VDC
R107
C46
TP-15
IC11
VARIABLE DC VOLTAGE FOR PICTURE & COLOR IN SEARCH MODE
ON SEARCH
L:STOP
H:SEARCH
R17
IC5
R114
10.4 V
R118
SWITCHING POINT A.D.J IN NORMAL P.B MODE
IC12
R117
NTSC (High)
R116
PB SW1(STILL)
IC10
D.SEARCH (High)
R94
R95 PB SW1(NOR)
C43
IC9
R103
NTSC PHASE
PAL REC PHASE
R91
R105
C45
SWITCHING POINT ADJ. IN REC MODE
REFERENCE SIGNAL
TP-13
C42
R82
R85
Q36
R90
D9
D10
C38
R180
R83
C41
D13
R84
R89
+ P.G AMP
− P.G AMP
MM2
MM1
FF1
GATE 1
MM3
GATE 2
SAMP-LING & HOLD
IC6 AN6344
COMPARISON SIGNAL
R130
R131
Q44
STOP(H)
C48
C55
C56,57 R113,114,115
30Hz TRAP
25Hz TRAP
S.F
Q39
Q37
NTSC(H)
PAL(H)
ON NORMAL LIMITER
Q38
R134
R133
R135
R110
R111
TP-17
PHASE CONTROL
TP-18
R142
R144
R143
C59
C76
C77
R146
SPEED CONTROL
R147
R153
R148
TP-19
TP-20
FOWARD
ON STOP
R43
R42
R33
Q5
Q6
R30
R31
R32
R34
R35
Q10
R40
R41
R46
REVERSE
R47
OPERATES FOR BRAKING MOTOR
MDA
J223
M
FG PAL:1600Hz NTSC:1920Hz
SWITCHING POINT ADJ. IN SEARCH MODE
R101 P.B SW2(NOR)
R100
D. SEARCH (High)
NORMAL (High)
R120 P.B SW2(STILL)
R121
R122
TRPZ (TP-15)
MM3
FF1
DRUM SAMPLING
Q35
INV
C35
TP-21
Q41,Q40
FG AMP
IC6 AN6344
FF4
DIF
INV
TRAPE -ZOID
GATE 3
MM5
GATE 4
C51
C52
DISCRIMINATOR
C53,54
R125
R124
NTSC (H)
PAL DISCRI
R97
R128
NTSC DISCRI
TP-12
R178
DRUM FLIP-FLOP OUT (IC6-20)
EX-OR GATE OUT (IC14-4)
V.P. POIS MMV TRIGGER IN (IC3-3)
V.P. POSI MMV OUT (IC13-3)
V.P. WIDTH MMV OUT (IC2-8)
OFF
ON
V.PULSE SW
R27
C22
R8
C12
P.POSI MMV
IC13
R9
P.WIDTH MMV
OUTPUT AMP
IC2 AN301
V.PULSE GENERATOR
TP-4
R10
Q43
DRUM FF TO SYSCON BOARD
V. PULSE TO Y AMP BOARD
TO BE ADDED TO VIDEO SIGNAL IN SEARCH MODE
a
b
c
d
e
f
g
h

Fig. 3-40 Drum servo block diagram

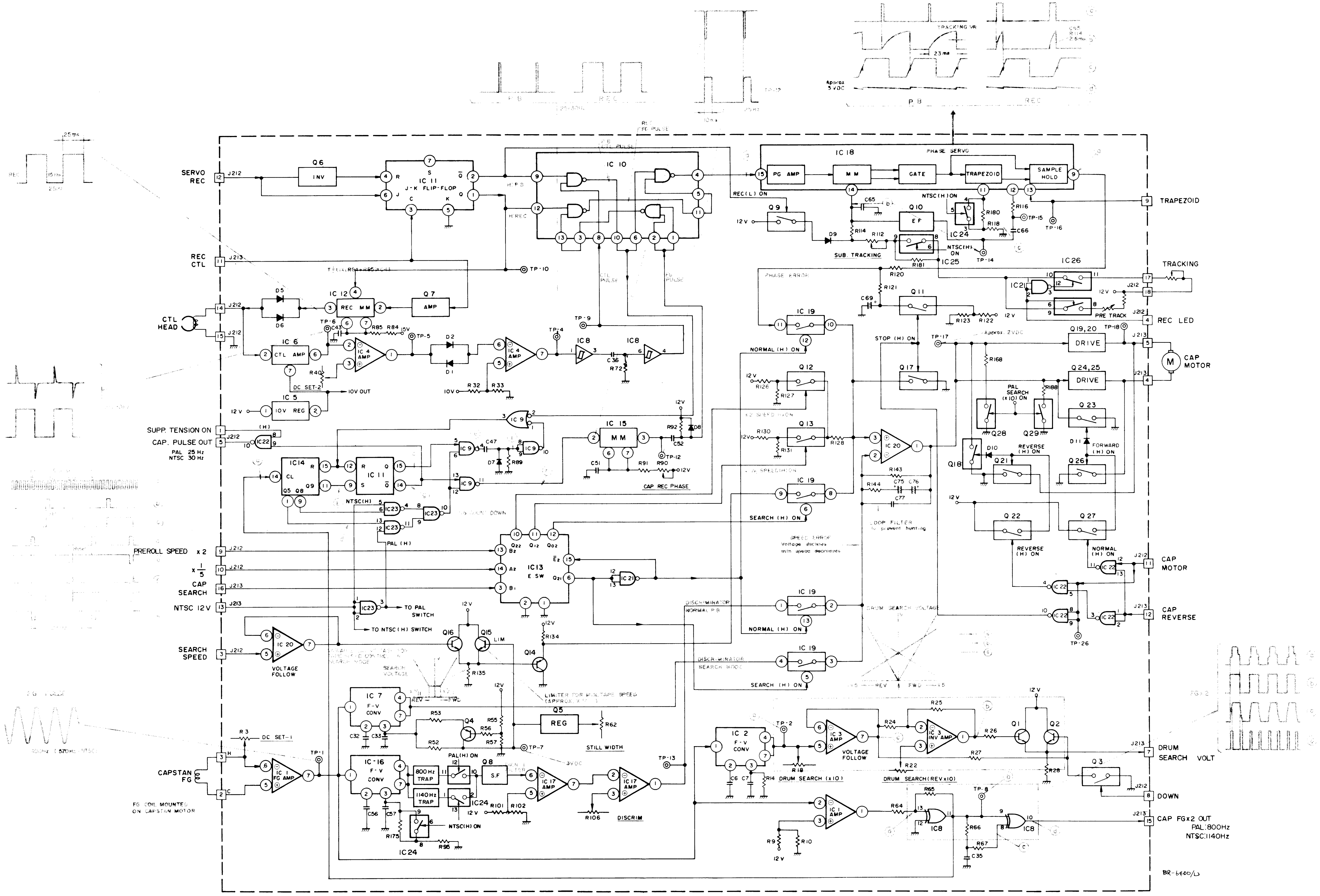

SERVO REC
REC CTL
CTL HEAD
SUPP. TENSION ON
CAP. PULSE OUT
PAL 25 Hz
NTSC 30 Hz
PREROLL SPEED x 2
x 1/5
CAP SEARCH
NTSC 12V
SEARCH SPEED
CAPSTAN FG
FG COIL MOUNTED ON CAPSTAN MOTOR
TRAPEZOID
TRACKING
REC LED
CAP MOTOR
CAP REVERSE
DRUM SEARCH VOLT
DOWN
CAP FGx2 OUT
PAL:800Hz
NTSC:1140Hz
Q6 INV
IC 11 J-K FLIP-FLOP
IC 10
IC 18
PHASE SERVO
PG AMP
MM
GATE
TRAPEZOID
SAMPLE HOLD
REC(L) ON
Q9
Q10 EF
NTSC(H) ON
IC 24
IC 25
SUB. TRACKING
PHASE ERROR
IC 26
IC 21
PRE TRACK
IC 12 REC MM
Q7 AMP
TP-10
TP-9
TP-4
TP-5
TP-6
IC 6 CTL AMP
IC 4 AMP
IC8
DC SET-2
IC 5 10V REG
10V OUT
IC 9
IC 15 MM
CAP REC PHASE
IC14
IC 11
NTSC(H)
IC23
COUNT DOWN
PAL (H)
IC13 E SW
TO PAL SWITCH
TO NTSC (H) SWITCH
IC 20 VOLTAGE FOLLOW
Q16
Q15
LIM
Q14
LIMITER FOR MAXIMUM SPEED
SEARCH VOLTAGE
IC 7 F-V CONV
REV
FWD
Q4
Q5 REG
STILL WIDTH
TP-7
IC 1 FG AMP
DC SET-1
TP-1
IC-16 F-V CONV
800Hz TRAP
1140Hz TRAP
PAL(H) ON
Q8 S.F
IC 17 AMP
DISCRIM
TP-13
IC 19
NORMAL (H) ON
2X SPEED (H) ON
SEARCH (H) ON
STOP (H) ON
Q11
Q12
Q13
IC 20
LOOP FILTER
SPEED ERROR
DISCRIMINATOR NORMAL P.B
DISCRIMINATOR SEARCH MODE
DRUM SEARCH VOLTAGE
Q17
TP-17
Q19,20 DRIVE
Q24,25 DRIVE
TP-18
PAL SEARCH (x10) ON
Q28
Q29
Q23
Q18
D10
D11
REVERSE (H) ON
FORWARD (H) ON
Q21
Q26
Q 22
Q 27
NORMAL (H) ON
IC 22
TP-26
IC 2 F-V CONV
TP-2
IC 3 AMP
VOLTAGE FOLLOW
IC 3 INV AMP
Q1
Q2
Q3
DRUM SEARCH (x10)
DRUM SEARCH(REV x10)
TP-8
IC 1 AMP
IC8
TRACKING VR
23 ms
Approx 3 VDC
P.B
REC
25 ms
BR-6600/L

Fig. 3-41 Capstan servo block diagram

3.3.2 Capstan servo circuit

1. Purpose

   This circuit controls tape speed so that the video heads can accurately track the recorded video signals.

   Tape control is performed for Recording, Playback, Still and Search modes.

   Two control systems are used for regulating speed and phase.

   Control signal
   - Speed: Rotational error is detected by using FG pulses generated by rotation of the capstan motor, and correction performed.
   - Phase: In the Recording mode, the 25 Hz signal counted down 1/16 from the capstan FG pulses and the vertical synchronizing component of the video are compared. During Playback, the control signal obtained from the tape is compared with a reference produced from a crystal, external SYNC or VIDEO IN signals.

   Relationship between the comparison and reference signals, which control tape speed in the Recording and Playback modes, is summarized as follows:

	Signal	Recording	Playback	
			Normal	Search
Speed	Reference	Reference voltage	Reference voltage	X1/5, X2 Search speed
	Comparison	FG (400 Hz)	FG (400 Hz)	FG (f change)
Phase	Reference	VIDEO IN	VIDEO IN EXT SYNC X-TAL	
	Comparison	FG (400 Hz)	PB CTL Signal (25 Hz)	

Table 3-13

2. Speed control system

   The frequency to voltage (F-V) converter converts variations of frequency produced by capstan motor rotation into voltage, which is employed for controlling the motor.

   The FG signal (400 Hz) from the capstan motor is amplified by IC1 and applied to pin 1 of IC16. The 800 Hz ripple component is removed from the IC16 F-V converter output voltage by a ripple component TWIN-T filter circuit and, through source follower Q8 and IC17 discriminator, the voltage goes to IC20 differential amplifier. This controls rotational speed of the capstan motor via the motor drive amplifier.

   When the speed increases, the period of the FG signal becomes shorter and the error voltage increases as shown in the timing chart. Conversely, if the speed decreases, the period of the FG signal becomes longer and the error voltage decreases.

Rotation of Capstan Motor	Faster than normal	Slower than normal
FG Signal Interval	Shorter	Longer
Detected Voltage Pin 3, 7 and 14 of IC17	Higher	Lower
Amplifier Pin 7 Voltage of IC17	Lower	Higher
Amplifier Pin 1 Voltage of IC17	Higher	Lower
Amplifier Pin 2 Voltage of IC20	Lower	Higher
Motor Current	Decrease	Increase
Rotation of Capstan Motor	Becomes slower	Becomes faster

Table 3-14

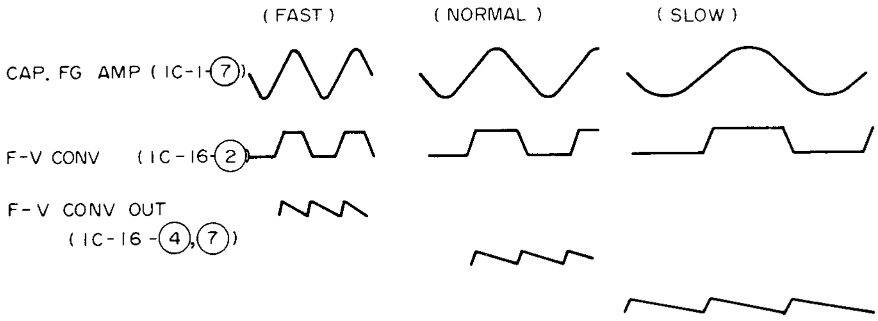


Fig. 3-42 Speed control timing

	IC22 Pin 6, 12	IC22 Pin 1, 2, 13	IC22 Pin 3, 5	IC22 Pin 4	IC22 Pin 11	Q22	Q21	Q18	Q19	Q27	Q26	Q23	Q24	CAPSTAN MOTOR
STOP STILL/ PAUSE	Ⓛ	L	H	Ⓗ	Ⓗ	ON	ON	ON	OFF	ON	ON	ON	OFF	STOP
PLAY FWD	Ⓗ	Ⓛ	Ⓗ	Ⓛ	Ⓗ	OFF	OFF	OFF	ON	ON	ON	ON	OFF	–·–·→
REV	Ⓗ	Ⓗ	Ⓛ	Ⓗ	Ⓛ	ON	ON	ON	OFF	OFF	OFF	OFF	ON	←–––

Table 3-15 MDA operations

2) Motor drive amplifier circuit

The capstan motor rotates when both Q19 and Q26 become ON simultaneously (for FWD mode), and Q24 and Q21 become ON simultaneously (for REV mode).

Switching functions of this circuit in each mode are shown in Table 3-15.

3. Phase control system

1) Comparison signal generating circuit

A. Capstan FG countdown and REC phase circuits

In the Recording mode, the 400 Hz FG signal is applied to pin 14 of IC14 from pin 7 of IC1 via a Schmitt circuit. (a)

IC14 decimal counter produces high output pulses corresponding to decimal numbers every time input pulses are applied.

When 9 pulses are counted starting from "0", pin 11 of IC14 becomes high potential. (b)

This sets the IC11 R-S flipflop circuit (c), which is not reset until a high pulse is applied to pin 12 of IC11.

When count proceeds from 0 to 5, the pin 1 voltage of IC14 is high (d) and a low pulse output appears at pin 4 of IC9 NAND gate. (e).

This low pulse is delayed slightly and inverted, then used to reset the R-S flipflop circuit and the counter. (f).

A low output pulse is obtained from IC9 pin 11 when both the R-S flipflop (IC11 pin 14) and the counter (IC14 pin 1) voltages become high.

This operation is performed every 16 FG pulses to yield 400/16 = 25 Hz which is used for the phase control circuit.

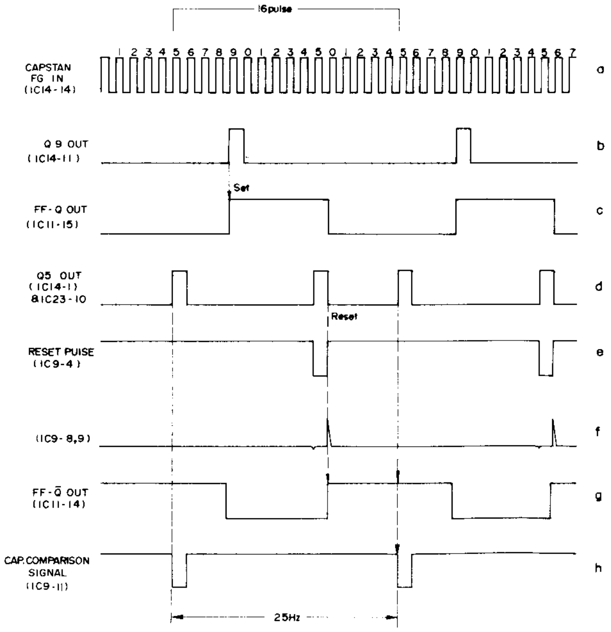

16pulse
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7
CAPSTAN FG IN (IC14-14)
a
Q 9 OUT (IC14-11)
b
Set
FF-Q OUT (IC11-15)
c
Q5 OUT (IC14-1) & IC23-10
d
Reset
RESET PUISE (IC9-4)
e
(IC9-8,9)
f
FF-$\bar{Q}$ OUT (IC11-14)
g
CAP.COMPARISON SIGNAL (IC9-11)
h
25Hz

Fig. 3-43 FG countdown timing

The countdown and countup operations of the tape counter are performed by detecting the momentary stop of the capstan when it changes rotating direction.

Complete stop of the capstan motor is detected easily by doubling the FG frequency using an exclusive OR gate of IC8. (See Fig. 3-44.)

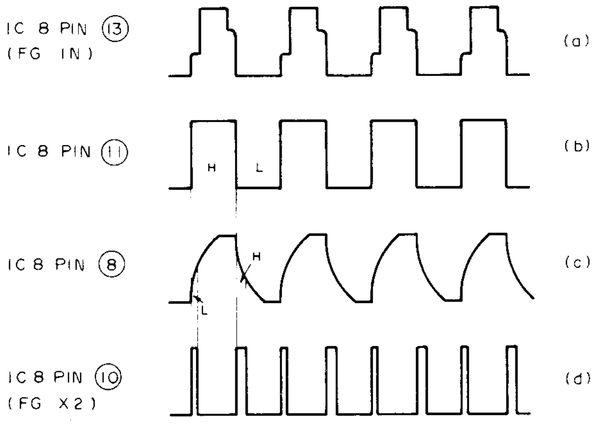

IC 8 PIN ⑬
(FG IN)
(a)
IC 8 PIN ⑪
H
L
(b)
IC 8 PIN ⑧
H
L
(c)
IC 8 PIN ⑩
(FG X2)
(d)

Fig. 3-44 X2 FG timing

B. Control signal amplifying and shaping circuit

This circuit amplifies the control signal, which is the comparison signal of the capstan servo circuit in the Recording mode.

IC6 amplifies the control signal from the control head, after which IC4 amplifies only 25 Hz signal component.

D1 and D2 attenuate overshoot and via an operational amplifier, the control signal waveform is shaped by a Schmitt circuit.

This Schmitt circuit prevents pulse width increase of the control signal in the shuttle search mode.

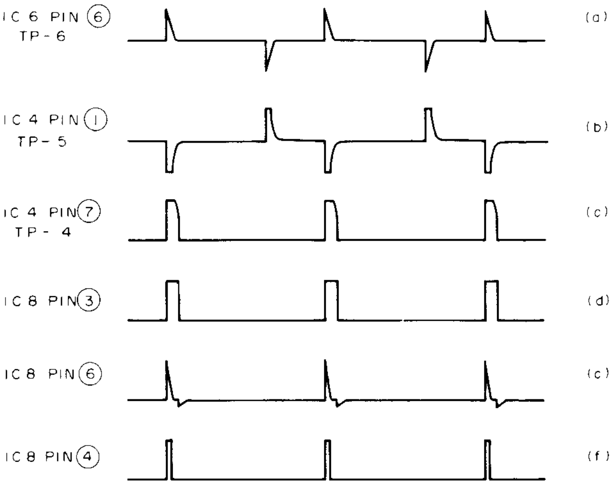

IC 6 PIN ⑥
TP-6
(a)
IC 4 PIN ①
TP-5
(b)
IC 4 PIN ⑦
TP-4
(c)
IC 8 PIN ③
(d)
IC 8 PIN ⑥
(e)
IC 8 PIN ④
(f)

Fig. 3-45 Control signal timing

2) Phase control circuit

[Recording mode]

The reference signal is a trapezoidal waveform produced from the VIDEO IN, EXT SYNC or X'TAL signals in the drum servo circuit.

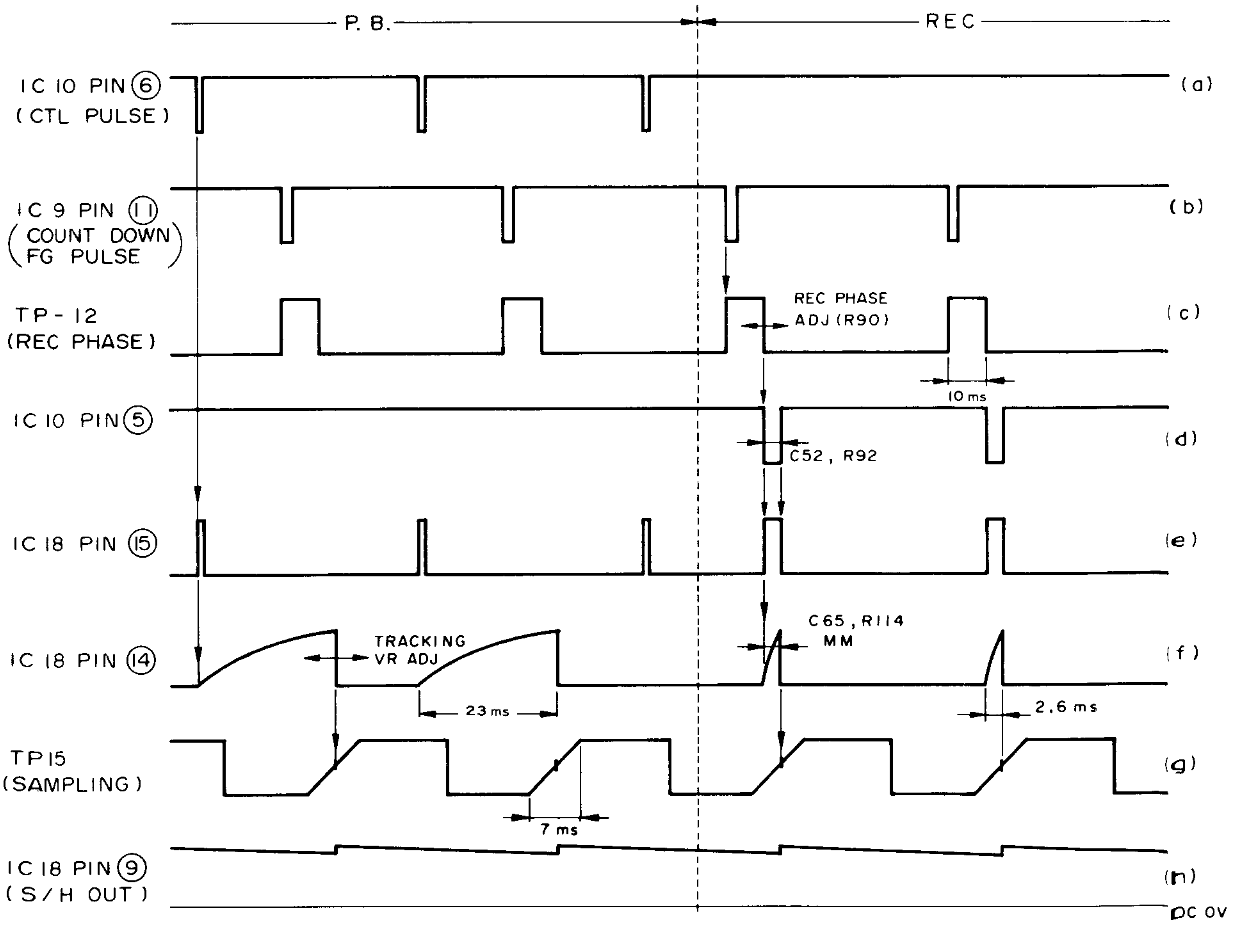

P. B.
REC
IC 10 PIN ⑥
(CTL PULSE)
(a)
IC 9 PIN ⑪
(COUNT DOWN FG PULSE)
(b)
TP-12
(REC PHASE)
REC PHASE ADJ (R90)
(c)
10 ms
IC 10 PIN ⑤
C52, R92
(d)
IC 18 PIN ⑮
(e)
IC 18 PIN ⑭
TRACKING VR ADJ
C65, R114 MM
(f)
23 ms
2.6 ms
TP15
(SAMPLING)
(g)
7 ms
IC 18 PIN ⑨
(S/H OUT)
(h)
DC 0V

Fig. 3-46 Phase control timing

The comparison signal is a 25 Hz pulse counted down from the 400 Hz FG signal by the counter circuit. Width of the 25 Hz pulse is adjusted by a monostable multivibrator in IC15 and its trailing edge triggers a monostable in IC18. During Recording, IC11 REC control flipflop is set and $\bar{Q}$ output of pin 2 is low. Therefore, Q9 is ON and the time constant of IC18 monostable is determined by R114 and C65.

The trapezoidal wave is sampled by the trailing edge of the flipflop output, while R90 (CAP REC PHASE) adjusts the width of the monostable to fix the sampling point of the trapezoid even if the mode is changed from Play to REC.

[Playback mode]
The CTL pulse is used for the comparison signal instead of the FG signal.
As IC11 REC control flipflop is not set in the Playback mode, pin 2 $\bar{Q}$ output voltage is high. Q2 is OFF and the time constant of IC18 monostable is decided by R112 (SUB TRACKING), R113, R114, C65 and the TRACKING VR.

4. Capstan REC timing memory circuit

REC Timing Memory controls timing so that new video signals can be recorded precisely continuing from previously recorded signals after the tape has been stopped for changing scenes or other reason then recording resumed. This ensures that the control signal pulses are recorded at equal intervals at the transition between recording segment.

A command from the system control circuit sets terminal J212 $\boxed{12}$ high, after which IC11 pin 6 goes high.
The leading edge of the REC CTL signal sets the flipflop and the Q and $\bar{Q}$ outputs become high and low respectively.
At this point, the monostable operates to convert the vertical sync signal from terminal J212 14 to a rectangular wave, which is sent to the CTL HEAD and recorded on the tape.

J212 $\boxed{12}$ is low during Playback by a command from the system control circuit and Q6 is OFF. High at pin 4 resets IC11, resulting in a low Q output and a high $\bar{Q}$ output.

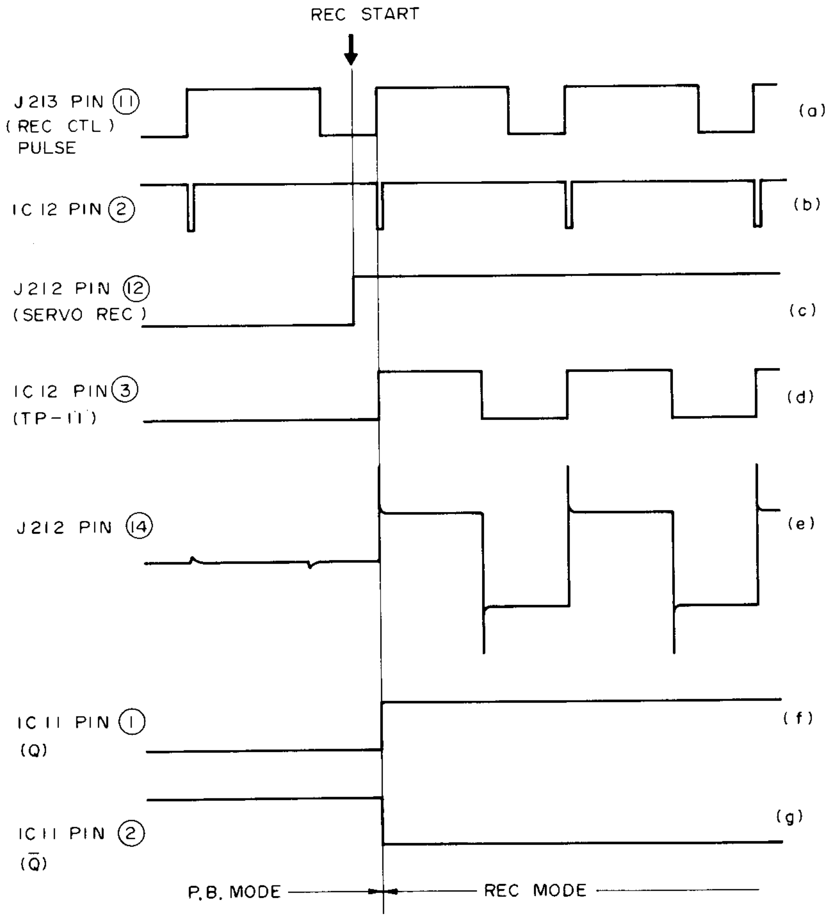


Fig. 3-47 Capstan recording phase timing

5. Speed control switch

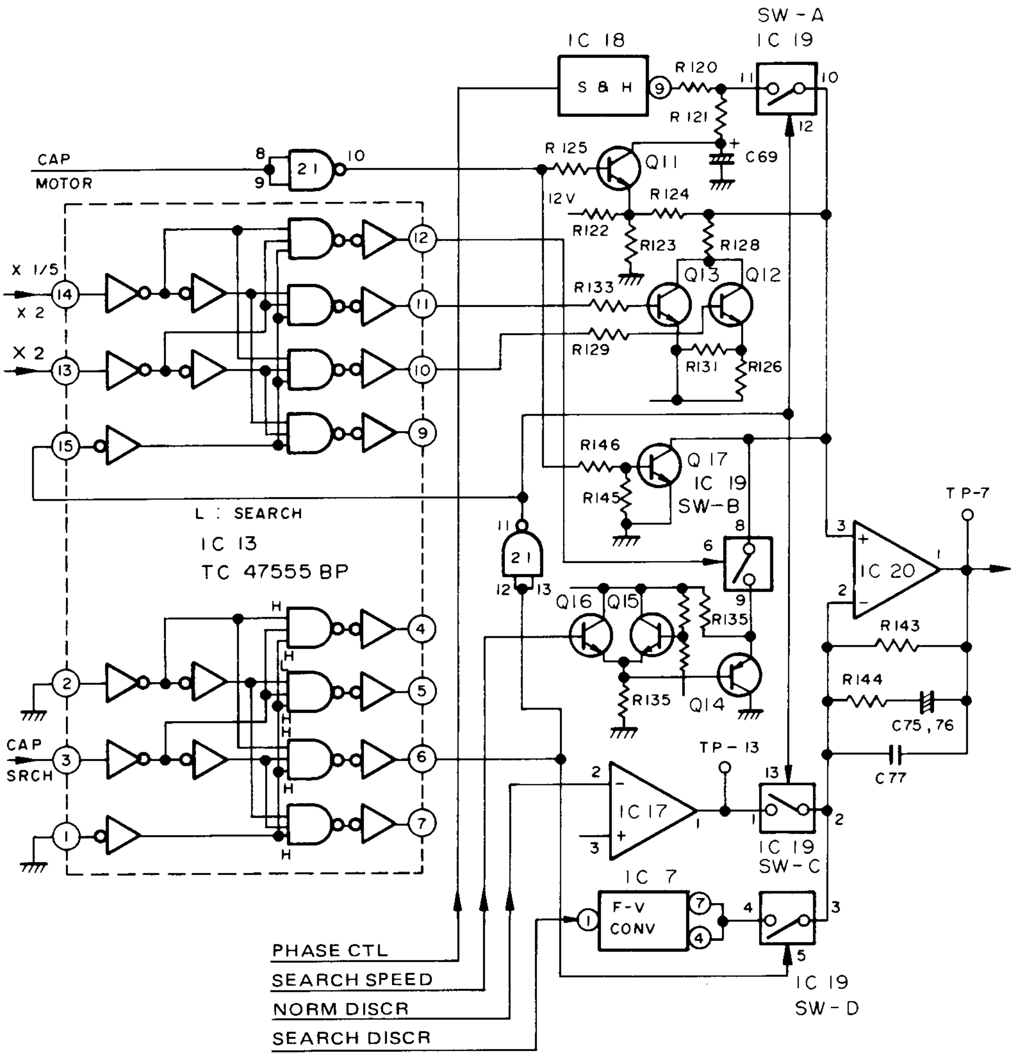

SW - A
IC 19
IC 18
S & H
R120
R121
C69
R125
Q11
R124
12V
R122
R123
R128
Q13
Q12
R133
R129
R131
R126
CAP
MOTOR
21
X 1/5
X 2
X 2
L : SEARCH
IC 13
TC 47555 BP
CAP
SRCH
R146
Q17
IC 19
SW-B
R145
21
Q16
Q15
R135
R135
Q14
TP-13
IC 17
IC 19
SW-C
IC 7
F-V
CONV
IC 19
SW-D
IC 20
TP-7
R143
R144
C75, 76
C77
PHASE CTL
SEARCH SPEED
NORM DISCR
SEARCH DISCR

Fig. 3-48 Speed control circuit

Electronic switches control DC voltage for tape speed according to mode.

SW-A through SW-D, Q12 and Q13 become ON when the high is applied to the control terminal (designated by an arrow) and transistor bases. The outputs of the phase and control circuits then go to IC20 operational amplifier.

Operational conditions for these switches are shown in Table 3-16.

INPUT						OUTPUT				Electronic Switch						MODE
X1/5 (A_2)	X2 (B_2)	($\bar{E}_2$)	CAP SEARCH (B_1)	GROUND		IC13 Pin				SW-A	SW-B	SW-C	SW-D	Q12	Q13	
				(A_1)	($\bar{E}_1$)	10	11	12	6							
L	L	L	(H)	L	L	L	L	(H)	(H)	OFF	(ON)	OFF	(ON)	OFF	OFF	CAP SEARCH
(H)	L	L	(H)	L	L	L	(H)	L	(H)	OFF	OFF	OFF	OFF	OFF	(ON)	X1/5
L	(H)	L	(H)	L	L	(H)	L	L	(H)	OFF	OFF	OFF	OFF	(ON)	OFF	X2
L	L	(H)	L	L	L	L	L	L	L	(ON)	OFF	(ON)	OFF	OFF	OFF	NOR P.B.

Table 3-16 Speed control switch

Q13 becomes ON only during PRE ROLL in the X1/5 mode and controls the tape speed for X1/5 using the voltage determined by R130 and R128. Q12 switches ON only during PRE ROLL in the X2 mode and controls the tape speed for X2 using voltage set by R126 and R128.

In absence of Q17, when the discriminator voltage ceases in the Still mode, IC20 pin 1 would saturate at high, while C75 and C76 charge to power supply potential. Since this discharge would interfere with speed control when switching from Still to Slow Search, Q17 grounds the positive side of op-amp IC20 pin 3.

IC13 is a two circuit demultiplexer. When $\overline{\text{E}}$ ($\overline{\text{ENABLE}}$) is low, the two binary inputs A and B can select a single desired output from among the four lines Q0 to Q3.

The time constant of C69 slows motor response when switching from Stop or Still to Play. Therefore, J212 11 is set to low during non-rotation of the capstan motor. Pin 10 voltage of IC21 NAND is high and Q11 is ON. Consequently, a voltage nearly equal to the phase error voltage becomes divided by R122 and R123 and applied to C69.

6. F-V converter circuit
   This circuit in IC7 converts the frequency of the FG signal at a certain tape speed into a DC voltage when the tape speed is changed by the remote control unit. Feedback is performed for the purpose of obtaining stable tape speed.

   Since accurate tape speed is required in the normal mode, the converter possesses high sensitivity in the 570 Hz region as shown in Fig. 3-49 (A).

   In the Search mode, as seen in Fig. 3-49 (B), the sensitivity is lower at higher speeds to avoid hunting effects, but at slow speeds high sensitivity is selected for controlling the capstan motor.

   R62 (STILL WIDTH) adjusts for constant DC voltage from Q5 emitter to determine the reference voltage in the Still mode.
   While the motor rotates slowly, the F-V voltage is low and a low output voltage is obtained from IC7 pin 3. At this time, Q4 is OFF and slope a-b is determined by R52.

   If the motor rotation exceeds the normal speed, pin 3 voltage of IC7 increases, Q4 switches ON and the slope changes to b-c which is determined by parallel resistors R52 and R53.

7. Voltage follower and Switch circuits
   These operate to efficiently transmit the search speed voltage when the tape speed is selected by the remote control unit and to prevent the speed from declining below the point where the capstan motor rotation becomes unstable.

   The control signal from the remote control unit goes to terminal J212 $\boxed{3}$. Search control characteristics are shown in Fig. 3-50.

   This voltage is applied to Q16 base via IC20 voltage follower circuit.
   As Q15 base voltage is constant, if the control signal declines to voltage ⓐ, Q15 prevents Q16 emitter voltage from declining below ⓑ. Q14

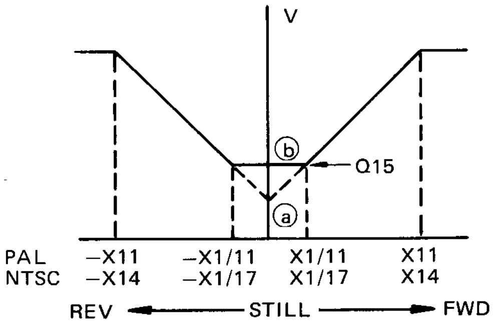
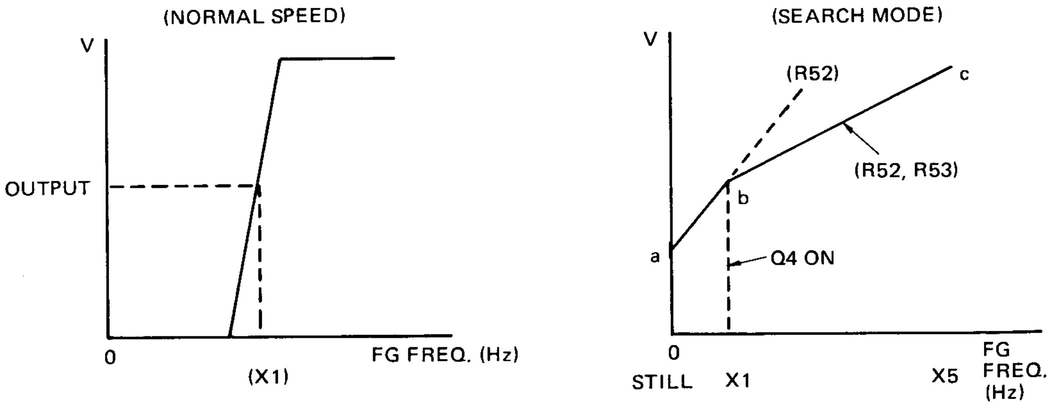


Fig. 3-50 Search control characteristics



(A) **(B)**

Fig. 3-49 F-V sensitivity

corrects the voltage drop component, after which the signal goes via IC14 to the non-invert input of IC20 op-amp and drives the capstan motor.
As a result, the minimum tape speed is limited to approximately 1/11 of the normal speed.

8. Drum search voltage generator
This circuit generates correction voltage to regulate head drum rotation in the Search mode.

1) FWD mode
Pressing the FWD key of the mainframe during playback yields X10 tape speed. When operated from the remote control unit, the speed range from 0 to 5X is continuously variable.

IC2 converter generates DC voltage which is proportional to the tape speed, but independent of the direction.

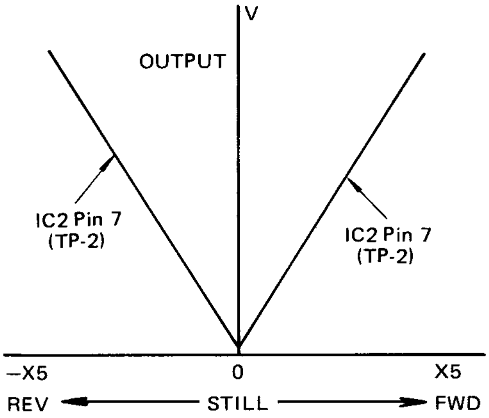


Fig. 3-51 F-V converter output

This voltage is applied to non-invert pin 5 of IC3 amplifier yielding output slope a-d from pin 7 as indicated in Fig. 3-52. Since it is also applied to the invert pin 2 of IC3, the output slope from pin 1 becomes DC.
Therefore, when the tape runs in FWD direction, bias voltage proportional to the FG frequency is supplied to Q1 and Q2 bases.

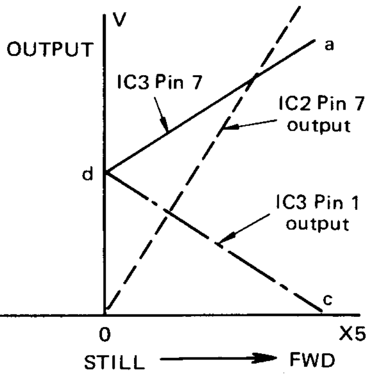


Fig. 3-52 Drum search voltage (FWD)

Q2 switches on from forward bias, raising Q1 emitter potential. This switches Q1 OFF and voltage a-d, which is proportional to the tape speed, is supplied to the drum servo circuit from TP-3 as the drum search voltage.
At X10 tape speed, the fixed reference voltage set by R18 controls the drum motor.

2) REV mode
Pressing the REV key of the mainframe during Playback yields X10 tape speed. When operated from the remote control unit, the speed range from 0 to 5X is continuously variable.
The IC2 F-V converter generates a DC voltage proportional to the tape speed. (See Fig. 3-53.)

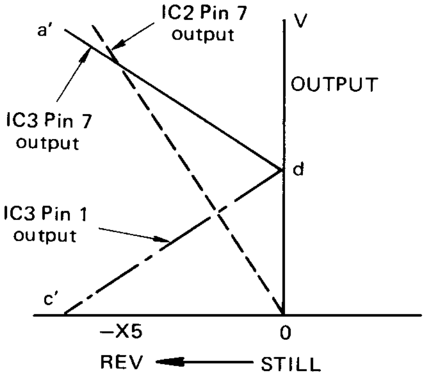


Fig. 3-53 Drum search voltage (REV)

This goes to non-invert pin 5 and invert pin 2 of IC3 to produce the output voltage d-a' from pin 3 and d-c' from pin 1, as indicated in Fig. 3-53. At this time, the high DOWN command from the system control circuit switches Q3 on and Q2 off.

Therefore, when the tape runs REV direction, the voltage d-c', which is inversely proportional to the tape speed, is supplied to the drum servo circuit as the drum search voltage.

At the X10 tape speed, the reference voltage set by R22 controls the drum motor.

3.3.3 Reel servo system

1. Objectives

   The reel servo controls winding torque and supply torque, which forms the load for the winding reel, in order to maintain optimum tape tension in all modes of operation.

2. General

   In the reel drive mechanism, both supply reel (SUP.) and take-up reel (T.U.) are directly driven by two DC motors, which are directly connected to each reel disk. This system avoids the idler and belt drives used in earlier VHS models.

   During Loading, Unloading, Play, FF/REW and other modes, winding torque and back tension are controlled by current supplied to the motors. Mechanical tension controls such as tension bands are not used.

   1) Tape direction and tension

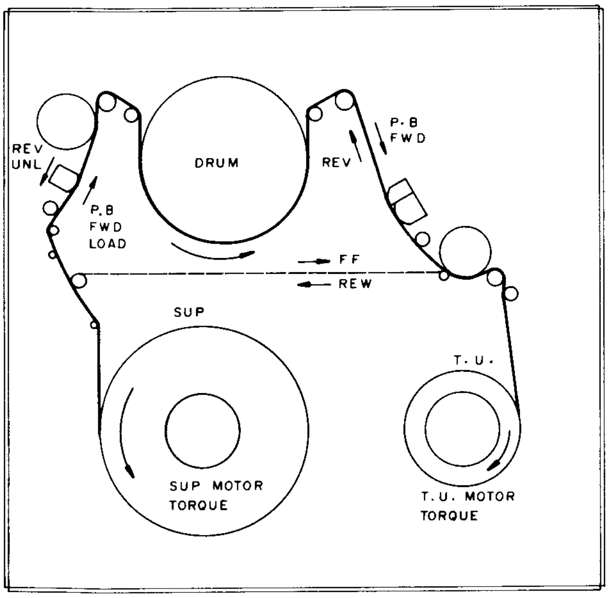


Fig. 3-55 Tape direction by modes

A. Play mode

In the Play mode, tape is transported by the capstan, while the T.U. reel motor drives the tape in the forward direction to prevent the tape, which runs between the capstan and the T.U. reel capstan, from slacking. At the same time, the SUP reel motor imparts the opposite torque in order apply the specicified tension to the tape, which is wound about the drum. This provides force against the pinch roller, i.e., back tension.

B. Search and Still modes

In the Search mode, drive voltage polarity applied to the reel motors is the same as in the Play mode. But the tape direction is determined by the direction of capstan rotation. Thus, in the reverse direction, tape becomes taken up by the SUP. reel, while the T.U. reel functions to provide load (i.e. back tension).

C. Loading and Unloading

When loading a tape, to prevent tape slack, and torque is applied on both the SUP. and T.U. reels. Torque is also applied to these reels during unloading for the same reason. However, a mechanical brake operates on the T.U. reel in this mode, and the tape feed and rewind are performed only with the SUP. reel.

Thus, in every mode except stop, the voltage always drives the SUP. motor counterclockwise (as observed from the top of set) and T.U. motor clockwise. When this direction of drive is the same as that of tape motion, the motor winds up the tape. When it is not the same direction, the motor torque cannot resist the tape pulling force, but works as load (back tension).

These are summarized in the following table. In each column, the direction of torque with respect to tape motion and its relative strength are shown.

	PLAY	S-FWD	S-REV	FF	REW	LOAD	UNL
SUP. reel	R,S	R,S	R,M	R,S	F,L	R,S	F,M
T.U. reel	F,M	F,M	R,S	F,L	R,S	R,S	F,S
Pinch roller	F	F	R	–	–	–	–

S : small M : medium L : large
R : reverse F : forward

Table 3-17 Reel torque in each mode

2) System description

In this servo system, there are two servo loops for the SUP. reel. One is tension servo which controls the SUP. back tension in the Play mode (including Search and Still), and the other is speed servo which controls winding torque in the REW mode. Only the speed servo loop is provided for the T.U. reel. The current and voltage feed back are provided to stabilize these loops. In modes where neither tension nor speed servo functions, a fixed voltage is used as reference. This is summarized below.

	PLAY	S-FWD	S-REV	FF	REW	LOAD	UNL
SUP. reel	TS	TS	TS	CEM	SS	FV	FV
T.U. reel	FV	FV	FV	SS	CEM	FV	FV

TS : Tension Servo SS : Speed Servo
FV : Fixed Voltage
CEM : Counter Electro-motive Force

Table 3-18 Servo system for each mode

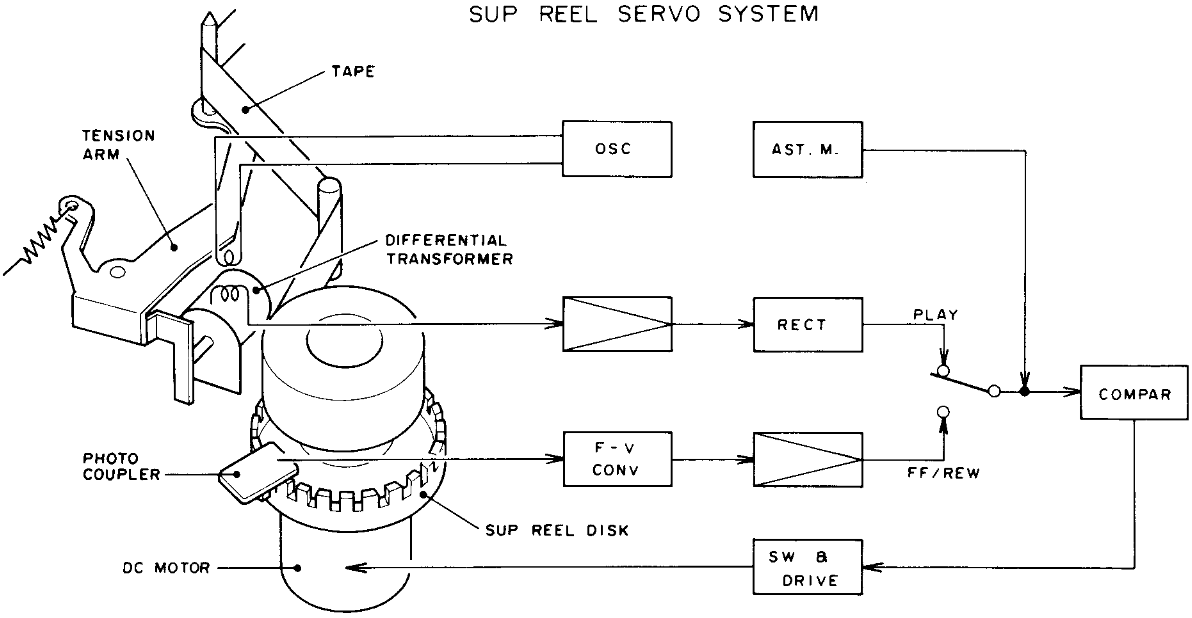

SUP REEL SERVO SYSTEM
TAPE
TENSION ARM
DIFFERENTIAL TRANSFORMER
PHOTO COUPLER
DC MOTOR
SUP REEL DISK
OSC
AST. M.
RECT
PLAY
COMPAR
F-V CONV
FF/REW
SW & DRIVE

Fig. 3-56 Reel servo system

As shown in Figure 3-56, tape drives a differential transformer through a tension arm. The position of the arm, i.e., the amount of tension, is converted to an electrical signal, which in turn maintains tension by regulating the motor torque.

In speed servo, constant rotation is controlled by using a frequency generator (FG) signal, which is generated from a photo interrupter and teeth on the reel.

DC error voltage, obtained from the differential transformer and photo interrupter, is mixed with a sawtooth signal, obtained from astable multivibrator, then supplied to a comparator. The comparator converts DC fluctuation into a difference in pulse width. This is applied to the motors via switching and drive circuits.

3) Differential transformer

The differential transformer is composed of a primary coil (L1) 2nd two differentially wound secondary coils (L2 and L2'), as shown in Figure 3-57. A constant level sinewave is applied to the primary coil and aferrite core is inserted into the coils.

When the core is completely pulled out of L2' as shown in Figure 3-58 (A), only L1 and L2 are coupled, and current passes freely through L2'. Consequently the maximum output is obtained at the output terminals.

When the core is in coil L2' as shown in Figure 3-58 (B), L1 is coupled with L2' together with L2. This results in a decreased output due to cancellation effects, which are proportional to the degree of coupling.

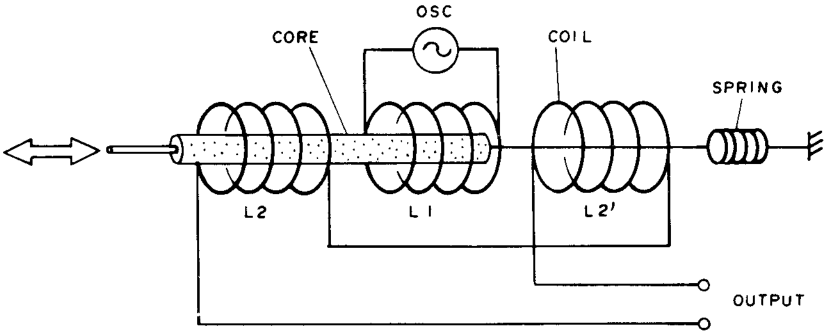
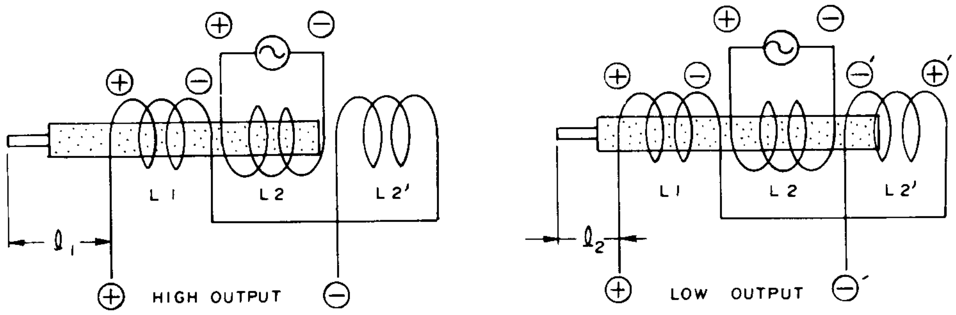

OSC
CORE
COIL
SPRING
L2
L1
L2'
OUTPUT

Fig. 3-57 Differential transformer


⊕
⊖
⊕
⊖
L 1
L 2
L 2'
ℓ_1
⊕ HIGH OUTPUT ⊖
⊕
⊖
⊕
⊖'
⊕'
L 1
L 2
L 2'
ℓ_2
⊕ LOW OUTPUT ⊖'

(A) (B)

Fig. 3-58 Output vs core position

4) Comparator and switching drive

The reel motor has a lower DC resistance of 6 to ohms, and the current, exceeding 400 mA at the maximum. Thus, the switching method is employed to make small output stage in order to reduce the load of output transistor.

The same circuit is used respectively in both SUP. and T.U. reel, and the explanation is given to SUP. side circuit, using figures 3-59 and 3-60. DC error voltage (Ve) from the differential transformer through IC1 is mixed with the sawtooth wave from the astable multivibrator, and then this mixed signal enters into pin 8 of comparator IC7. When the sawtooth wave becomes lower then the comparator threshold hold voltage (Vt), the output of pin 6 folls down to zero to make the

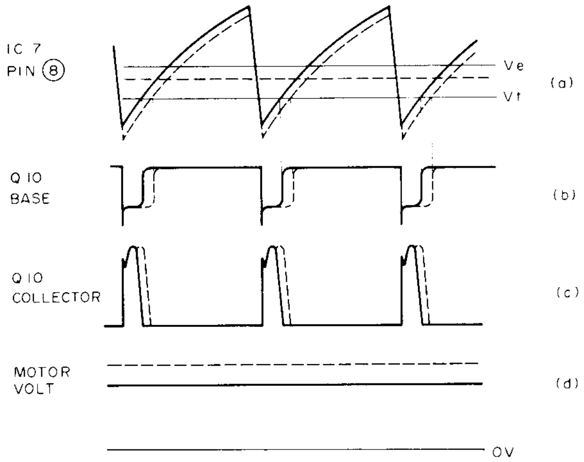


Fig. 3-60 Switching waveform

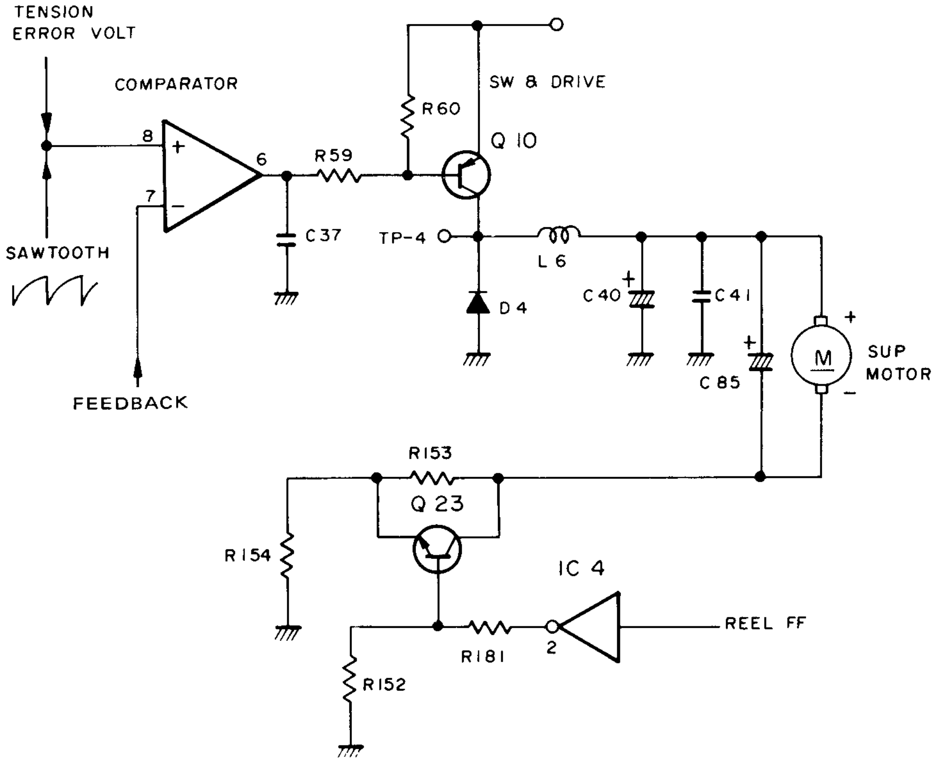

TENSION
ERROR VOLT
COMPARATOR
8
+
7
−
6
SAWTOOTH
FEEDBACK
R59
C37
R60
SW & DRIVE
Q 10
TP-4
L 6
D 4
C 40
C 41
C 85
+
M
SUP
MOTOR
−
R153
Q 23
R154
IC 4
R181
2
REEL FF
R152

Fig. 3-59 Comparator and switching/driver

PIN No.	COMMAND	STOP	LOAD	UNL	PLAY	FWD	REV	STILL	LONG STILL	FF	REW
1	SUP. TENS	L	L	L	H	H	H	H	H	L	L
2	REEL LOAD	L	H	L	L	L	L	L	L	L	L
3	REEL REW	L	L	L	L	L	L	L	L	L	H
4	REEL FF	L	L	L	L	L	L	L	L	H	L
5	REEL STILL	L	L	L	L	L	L	H	H	L	L
10	ACCESS	L	L	L	L	L	L	L	L	H, L	H, L
11	REEL UNL	L	L	H	L	L	L	L	L	L	L
12	T.U. TENS	L	L	L	H	L	L	L	L	L	L
13	STOP	H	L	L	L	L	L	L	L	L	L
14	CAP. SEARCH	L	L	L	L	H	H	H	H	L	L
16	LONG STILL	L	L	L	L	L	L	L	H	L	L
18	DOWN	L	H	L	L	L	H	L	H	L	L

Pin No. : Connector J202

Table 3-19 Commands in various modes

switching and driving transistor Q10 on, the pulse as shown in figure 3-60 (c) is generated. This pulse is converted to DC by the integration circuit, composed of L6 and C40, to drive the motor. That is, the changes of Ve are transformed into that of pulse width and then into that of drive voltage. D4 workers as a damper to absorb the negative part of pulse, generated by L6.

5) Commands in various modes
In the reel servo system, the switching command signals are supplied from the system control board to change the tension for each mode. These commands are summarized in the next table.

3. System and Circuit Description
(Refer to block diagram Fig. 3-54.)

1) The tension servo circuit is provided only in the SUP. side of the system and operates only when the tape is wound around the alarm.
In the first place, the Play mode operation is explained as a fundamental function of the tension servo.
Assume that the tension force becomes weak mementaly by some reason, then the tension pushes the differential transformer core into the coils. When the core is inserted into the coil, the output voltage of pin ⑭ becomes lower than the reference voltage, because the differential transformer output voltage is set to be equal to the reference voltage when the core is completely out of coil, by adjusting the variable resistor R1, which is connected between the transformer and the amplifier IC1.

This output voltage is rectified by the diodes D1 and D2, and applied to the inverse input pin⑥on IC1 through the voltage follower to raise the output level. By the way, the non-reverse input voltage in IC1 is determined by R167, and becomes the back tension reference voltage in Play mode.

This voltage is applied to the inverse input pin ⑨ through the emitter follower Q24. Q25, which is in between A24 and pin⑨, is the limitter to keep the motor input current of 20 mA at the minimum, in order to prevent the motor from going out of the servo control range even for the extremally lower motor current.

As seen from the provious description, the IC1 output from pin⑧will decrease and enter into pin ①of IC2 through the electronic switch. While the switch is "on" in Play mode, the reduced voltage decreases the DC level of saw-tooth wave, mixed at the comparator IC7 pin 8, and so widen the output pulse width. As explained in 3.2.4, this pulse of wide width rises the final output DC voltage to impart the motor more larger torque. This increased torque works opposite way to the tape moving direction, and so the tension will increase, resulting the constant tape tension control.
This situation is simply tabulated as below:

Tension		Core		OSC output		Comparator input		Driver output		Motor torque		Tension
weak	→	enter	→	decrease	→	lower	→	rise	→	larger	→	stronger
strong	→	exit	→	increase	→	rise	→	lower	→	smaller	→	weaker

Table 3-20 Tension servo operation

2) Speed servo

In FF mode, speed works in the T.U. portion, and in REW mode, it works in the SUP. portion.

This servo controls the reel rotation speed to be constant in order to complete the tape winding in the constant time both in FF and REW modes. The circuit for SUP. and for T.U. are the same one, and the operation of the servo is summarized as below for the SUP. portion operation during REW mode.

In the mean time, the back tension is applied by the T.U. side circuit to remove the tape winding tension fluctuation by utilizing the motor counter-electromotive force. This is the same situation as in the SUP. reel at FF mode. As can be explained in Fig. 3-5, in FF mode, Q10 and 23 are "off" and short DC motor through R153 and R154. Then T.U. reel pulls the SUP. reel to generate the motor counter-electromotive force, which acts as a load.

The current flows from motor ⊖ (negative) terminal to R135, R154 earth, D4, L6 and to motor ⊕ (positive) terminal. The resistance of 100 Ω at R153 was selected to assure the pertinent back tension for winding the cassette.

Motor speed (SUP reel)		Photo coupler frequency		F-V conv. output IC10, Pin 4		Comparator input IC7, Pin 8		Driver output Q10 collector		Motor speed (SUP reel)
fast	→	higher	→	increase	→	increase	→	decrease	→	slower
slow	→	lower	→	decrease	→	decrease	→	increase	→	faster

Table 3-21 Speed servo operation

3) Operation of electronic switch at various modes
IC or transistor switch controls the supply voltage or the servo loop to keep the pertinent tension in every mode of operation.

Explanation to each switch: ON command for the associated switch is shown in the parenthesis ( ).

E. SWITCH (IC - PIN No., TRANSISTOR)		LOAD	UNL	PLAY	FWD	REV	STILL	LONG STILL	FF	REW
IC2	1, 2, 13	–	–	ON	ON	ON	ON	ON	–	–
IC2	3, 4, 5	–	ON	–	–	–	–	–	–	–
IC2	6, 8, 9	–	–	–	–	–	–	–	–	ON
IC2	10, 11, 12	ON	–	–	–	–	–	–	–	–
IC9	1, 2, 13	–	–	–	–	–	–	–	ON	–
IC9	3, 4, 5	–	–	–	–	–	–	–	–	ON
IC9	6, 8, 9	ON	ON	ON	ON	ON	ON	ON	ON	–
IC9	10, 11, 12	ON	ON	ON	ON	ON	ON	ON	–	ON
IC14	1, 2, 13	–	–	–	–	–	–	–	ON	–
IC14	3, 4, 5	–	–	ON	ON	ON	ON	ON	–	–
IC14	6, 8, 9	–	–	–	–	–	ON	ON	–	–
IC14	10, 11, 12	ON	ON	–	–	–	–	–	–	–
Q1		ON	–	–	–	–	–	ON	–	–
Q2		ON	ON	–	–	–	*ON	–	–	–
Q5		ON	–	–	–	ON	–	ON	–	–
Q6		–	–	–	–	–	*ON	–	–	–
Q11		ON	ON	ON	ON	ON	ON	ON	ON	–
Q12		–	–	–	–	–	–	–	**ON	**ON
Q13		–	–	–	–	–	–	–	***ON	***ON
Q16		ON	ON	ON	ON	ON	ON	ON	–	ON
Q18		–	–	–	–	–	–	–	**ON	**ON
Q19		–	–	–	–	–	–	–	***ON	***ON
Q20		ON	ON	ON	ON	ON	ON	ON	–	–
Q21		–	–	–	–	–	–	–	***ON	***ON
Q22		ON	ON	ON	ON	ON	ON	ON	ON	–
Q23		ON	ON	ON	ON	ON	ON	ON	–	ON
Q26, Q27		–	–	–	–	–	–	ON	–	–
Q28		ON	–	–	–	ON	–	ON	–	–
Q29		–	–	–	–	–	ON	ON	–	–

— mark : OFF

* : Moment from play to still.

** : ON for –99 to 0 at counter in FF mode, ON for 99 to at counter in REW mode.

*** : ON for approximately 1.1 second after changing to FF mode or REW mode.

Table 3-22 Electronic switch operation in various modes

(1) IC2-1, 2, 13 (SUP. TENSION)
ON when the tape is wound around the drum. The tension servo works on the SUP. side from the differential transformer through IC1.

(2) IC2-3, 4, 5 (REEL UNL)
ON during unloading to supply the SUP. motor with the pedetermined determined by R32. By this switch operation, the speed of unloading tape is wound faster than that of the tape returning into the cassette in order to avoid the slack of the tape.

(3) IC2-6, 8, 9 (REEL REW)
ON in the REW mode to apply the speed servo on the SUP. side from the photo-interrupter through IC10 and 11.

(4) IC2-10, 11, 12 (REEL LOAD)
ON in the Loading mode to supply to the SUP. side the pre-determined voltage determined by R29. By this switch operation, the back tension during the loading is determined.

(5) IC9-1, 2, 13 (REEL FF)
ON in FF mode to amplify the T.U. motor terminal voltage, applied at the inverse input pin⑨of IC8, and to return this voltage to the inverse input pin⑦of comparator IC12 as a voltage feed back signal for the speed servo. In FF and REW mode, the tape winding speed is so fast that the voltage control is used in speed control to complete the FF or REW in the speed specified for the respective tape.

(6) IC9-3, 4, 5 (REEL REW)
ON in the REW. This switch applies the voltage feed back, which is the same as the case of IC9-1, 2, 13.

(7) IC9-6, 8, 9 (REEL REW)
ON in all the mode but REW mode. Utilizing the voltage drop due to the motor current which flows the resistor R154 of 0.47 ohm, the current feed back of SUP. motor is applied to the inverse input pin②of IC8, and is returned to the pin⑦of IC7 after being amplified.
In the other modes than FF and REW mode, the tape winding speed is slow and it is intended to control the tape tension. So, the motor torque is controlled by the current.

(8) IC9-10, 11, 12 (REEL FF)
ON in all the mode but FF mode. This switch applies the current feed back from T.U. motor to pin ⑦ of IC7, in much similar manner as explained on IC9-6, 8, 9. (Detailed explanation is omitted)

(9) IC14-1, 2, 13 (REEL FF)
ON in FF mode. Apply the speed servo to the T.U. motor from the photo-interrrupter on T.U. side through IC13 and 11.

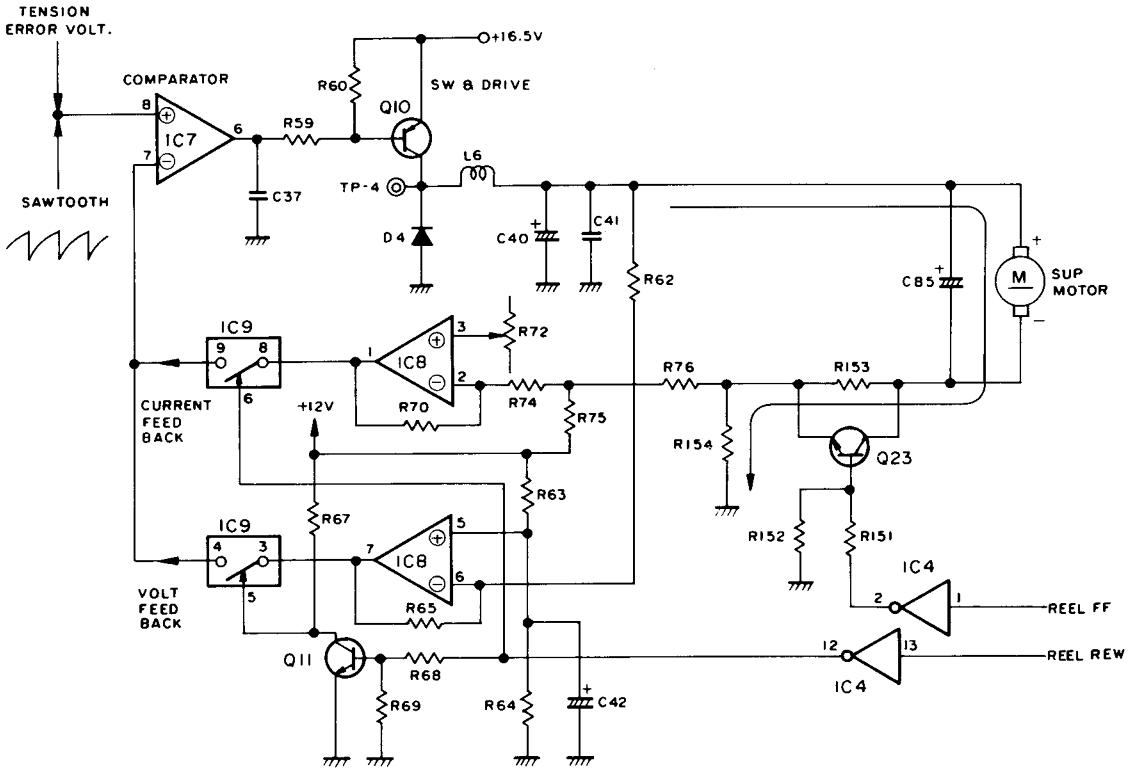

TENSION ERROR VOLT.
COMPARATOR
IC7
SAWTOOTH
+16.5V
R60
SW & DRIVE
Q10
R59
C37
TP-4
L6
D4
C40
C41
R62
C85
M
SUP MOTOR
IC9
CURRENT FEED BACK
IC8
R72
R70
+12V
R74
R75
R76
R153
R154
Q23
R63
R67
IC9
VOLT FEED BACK
IC8
R65
R152
R151
IC4
REEL FF
REEL REW
IC4
Q11
R68
R69
R64
C42

Fig. 3-61 Feed back circuit

(10) IC14-3, 4, 5 (T.U. TENS, CAP SEARCH)
ON in play and search mode. In these modes, the pre-determined voltage determined by R142 is applied to the T.U. side. This is the winding torque in the general Play mode.

(11) IC14-6, 8, 9 (REEL STILL)
ON in Still mode (including long Still mode). The voltage, determined by R145, controls the constant torque of the T.U. motor not to avoid the tape slack between the capstan and T.U. reel.

(12) IC14-10, 11, 12 (REEL LOAD, UNL)
ON in Loading and Unloading mode. Apply the pre-determined torque, determined by R139, to the T.U. motor.
This torque supplements the mechanical brake, which is already applied.

(13) Q1 (REEL LOAD, LONG STILL)
ON in Loading and long Still mode. When the recorder is stopped while the power being on for long period of time, the capacitor C10 and C11 will be so fully changed that it takes time to discharge these capacitors after loading, and it takes long for the tension pole to be stabilized. And so, during the unloading, Q2 shorts C10 and C11, and also Q1 does IC1 pin⑥and ⑦ in order to apply the optimum tension at the time of loading by providing the constant voltage, determined by R167, to pin⑦of IC1. Being in the long Still mode, the tape is slack and the tension pole pushes the differential transformer core into the coils to fully charge C10 and 11 (which is the reverse polarity compared with the above mentioned Stop mode). So, pin ⑥ and ⑦ of IC1 are shorted during the long Still mode not to change to capacitor C10 and 11, in order to quickly stabilize the tension when the mode changes from long Still mode to Play mode.

(14) Q2 (REEL LOAD/UNL, STILL)
ON in Loading and Unloading mode. (Refer to Q1) In Search mode, at the time of change over from REW to FWD or vice versa, the picture becomes Still mode momentary. Even at this moment, Q2 becomes ON to discharge the long time constant capacitor C10 and 11 to improve the tension rising time at the moment of the change-over.

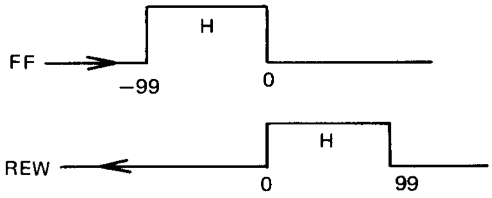
(15) Q5 (DOWN)
In REW mode, this switch becomes ON when the capstan changes from forward rotation to backward rotation, and conects the D1 anode to the earth. Input voltage for pin 3 of IC1 decreases with the connection, and the SUP. motor torque is finally raised higher than that of the normal Play mode through each amplifier stage to avoide the picture drop out, which is apt to occur at the initial portion of the tape wound around the drum at the time of REW motion.
This switch also becomes ON in Loading and Unloading mode, but this does not effect the torque by the function of other electronic switches.

(16) IC14-1, 2, 13 (REEL FF)
Momentary ON when becoming Still (long Still) mode, and switches on Q2 at that moment.

(17) Q11 (REEL REW)
OFF in REW mode, and switches on the switch 9, 4 and 5 of IC9.

(18) Q16 (REEL FF)
OFF in FF mode, and switches on the switch 1, 2, and 13 of IC9.

(19) Q12, Q18 (ACCESS)



ACCESS command becomes H for −99 to 0 in FF mode, and for 99 to 0 in REW mode to switch on Q12 and Q18. The F-V converter IC10 (IC13), which uses the charge pump, outputs the DC voltage, which is proportional to the input frequency, but when the capacitor C47 (C64) is connected paralleled to the charge and discharge capacitor C46 (C63), the output from pin④of IC10 (pin④of IC13) will rise to result in the motor speed reduction.
In short, during counter Search mode, the tape speed is reduced between 99 and 0 (−99 and 0) in the REW mode (FF mode) to precisely stop the reel at near zero point.
The designations and/or numbers given in the parentheses are for Q18.

(20) Q13, Q19 (REEL FF, REW)
For approximately 1.1 second since FF mode or REW mode is taken, H pulse is generated to switch ON Q13 and Q19 from the mono-multiplexer IC15.
This will raise the output of pin①and pin ⑭of IC11, and cut off the diode D5 and D7 to disengage the speed servo loop.

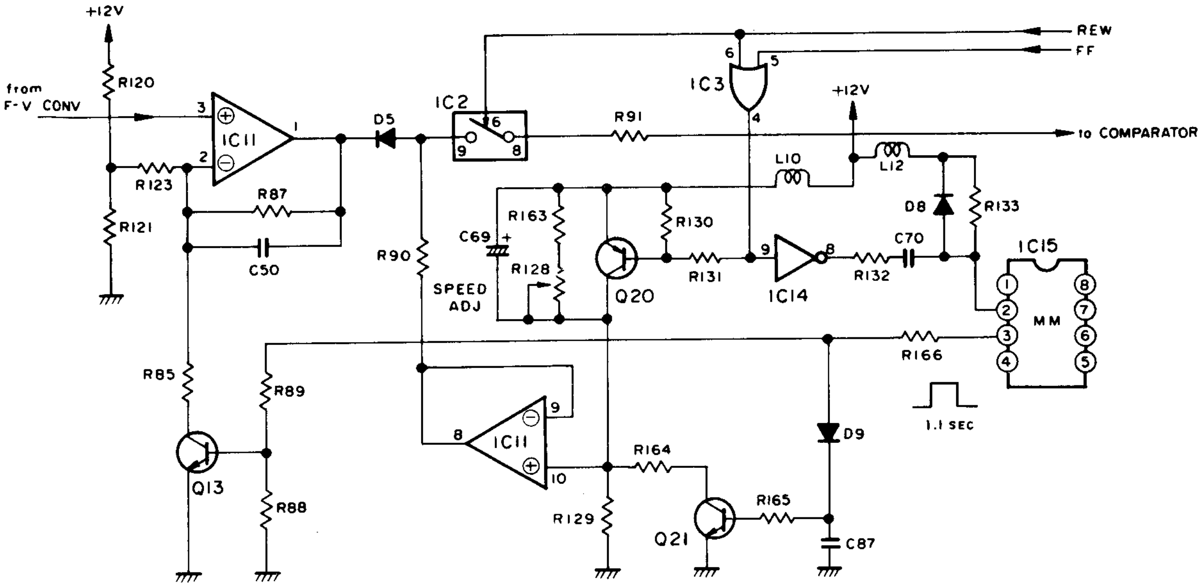

+12V
from
F-V CONV
R120
R123
R121
IC11
R87
C50
D5
IC2
6
9
8
R91
IC3
5
4
REW
FF
+12V
to COMPARATOR
L10
L12
R163
C69
R128
SPEED
ADJ
R90
Q20
R130
R131
IC14
D8
R133
C70
R132
IC15
MM
R166
1.1 SEC
R85
R89
Q13
R88
IC11
R164
R129
Q21
R165
D9
C87

Fig. 3-62 FF and REW boost circuit

(21) Q20 (REEL FF, REW)

OFF in FF or REW mode. The predetermined voltage, decided by R128 (FF and REW speed adjustment resistor), enters into the comparator through the pin⑩and⑧of the voltage follower IC11 to keep the constant reel speed.

(22) Q21 (REEL FF, REW)

ON for approximately 1.1 second by means of the mono-multivibrator since starting the FF or REW mode. (Refer to Fig. 3-62.)

At the moment of starting FF or REW mode, Q20 becomes OFF and C69 starts charging, but, due to the fact that R164 is parallel to R129, the voltage of pin ⑩ of IC11 decreases faster than the case where there is not Q21, as shown in Fig. 3-62.

In this period, the motor drive voltage will be increased. In other words, at the start of FF or REW mode, motor speed can not increase abruptly, and so the speed is accelerated with the aid of Q13 or Q19.

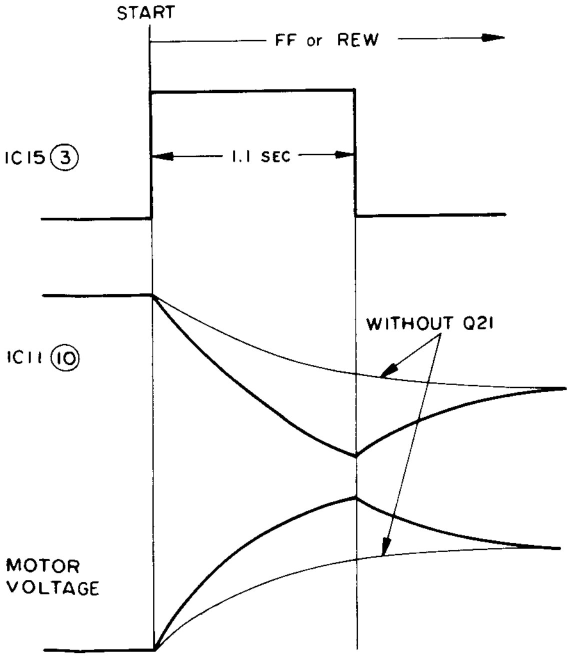


Fig. 3-63 Operation scheme of Q20 and Q21

(23) Q22 (REEL REW)

OFF in REW mode, R149 becomes series to R150 to generate the back tension in REW mode by means of T.U. motor counter-electromotive force. Refer to sect. 3.3.2.

(24) Q23 (REEL FF)

OFF in FW mode. Same operation as Q23.

(25) Q26, Q27 (LONG STILL)

ON in long Still mode to make the non-reverse input in ⑩of IC1 as a source voltage.

Consequently, the input to pin⑧of the comparator IC7 raises, and Q10 drive output decreases to weaken the SUP. tension.

It is not good both for head and tape to leave in Still mode for long time, and so this operation is incorporated to avoid this inconvenient condition by lowering the tension around the drum in 2 or 3 minutes after starting the Still mode.

(26) Q28 (DOWN)
ON in Loading, REV, Long Still modes to raise the loop gain of the tension servo by connecting R177 parallel to R137. In loading and long Still mode, the SUP. winding torque does not affected by means of other switches, but in REV mode, this switch enbances the SUP winding torque together with Q5.

(27) Q29 (REEL STILL)
ON in Still (long still) mode. H stays as it was even when DOWN command moves from REV to Still mode, and so the SUP. back tension is stronger than the normal Play mode by means of of Q5 operation.
The head and/or the tape might be damaged by this stronger tension.
To avoid this possibility, Q29 switches on to cut Q5 and Q28 off when moving from REV mode to Still mode.

3.4 VIDEO SYSTEM

3.4.1 Outline

Video signals are recorded and played back by using special rotary video heads. In the recording process, a bandpass filter separates the chrominance (chroma) signal from the luminance (Y) signal. The luminance component is then frequency modulated, while the chroma component is converted to a low frequency. Afterwards, the two signals are mixed and recorded on the tape.

During Playback, filter networks again separate the luminance and chroma components. The FM luminance signal is demodulated and the chroma signal is returned to its normal spectral position. After going through automatic correction circuits, the signals are recombined in a form which can be viewed on a TV monitor.

A separate pair of video heads is employed for the Search, Slow and Still modes, and contribute to clean one-field playback picture reproduction.

3.4.2 Luminance signal recording system

See luminance signal block diagram of Fig. 3-68.

1. Outline
   Signal inputs for recording, line inputs or TV input is selected by the input select switch, then sent to the luminance (Y) amplifier board.
   The input video signal is branched in two directions: one to the drum servo circuit board for servo reference signal and the other to the AGC (automatic gain control) circuit at pin 1 of IC1 (AN6310). This circuit functions to maintain a fixed signal level. The AGC output at pin 24 is branched in three directions; to emitter-follower Q4 as the recording signal, to IC7 (HA11703) pin 17 as the E-E mode Y signal, and to the chroma board (P & N color and SECAM color) for use in color processing.

   In the Q4 circuit, the signal is applied to lowpass filters LPF-1 and LPF-2, which respectively limit the PAL and SECAM bandwidths. The signal selected by electronic switch IC2 is sent via IC1 amplifier and Q2 emitter-follower to the pre-emphasis circuit.

   Since pre-emphasis can cause overshoot in the areas of rapid signal level changes, the white and dark clip circuits are used to prevent over-modulation. The luminance signal is then frequency modulated from 3.8 MHz at the sync tip to 4.8 MHz at the white peak. If input video signal is color, the FM signal passes through a high-pass filter which attenuates the lower sideband where the down converted color signal is to be inserted, and is sent to the pre/record amplifier (PRE/REC) board via the electronic switch IC3. If the input video signal is black and white, this high-pass filter is bypassed.

At the PRE/REC board, the FM signal is mixed with the converted chroma signal and amplified by the recording amplifier IC1, then applied to the video heads through the HEAD P.W.B. and rotary transformer.

A relay RY-1 on the PRE/REC board sets the rotary transformer and consequently the video heads for the Recording or Playback mode.

The luminance signal sent to IC7 pin 17 is amplified by the E-E amplifier and goes via electrical switch and pin 16 to the emitter-follower Q14. One Q10 output line goes to the sync separator from which the separated sync signal is sent to the color circuit for AFC (automatic frequency control) operation in the color recording system. The other Q10 output goes to the output circuit for the E-E video signal. The output circuit operates to provide the signal for monitor use while recording, and the playback video signal during Playback.

2. Circuit elements

(1) AGC (Automatic Gain Control) circuit

The keyed AGC system detects the amplitude of the sync component and adjusts the gain in order to obtain the required amplitude. An advantage of the keyed AGC design with respect to a peak detecting type AGC, is that it restores the video level to its intended original level.

The basic principle is illustrated in Fig. 3-64, block diagram and corresponding waveforms.

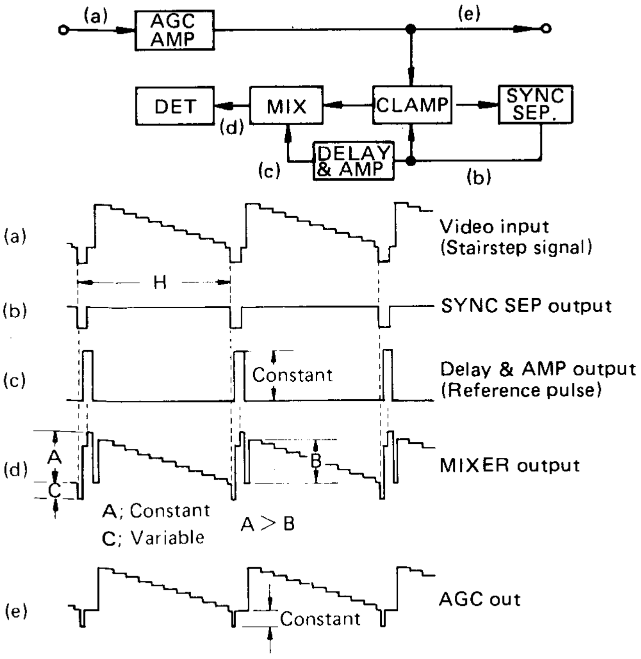


Fig. 3-64

(2) Electronic switch IC2

The signal that passed through LPF-1 and EQ1 enters pin 1 of IC2, while the signal through LPF-2 and EQ2 enters pin 3 of IC2.

Switching is made by means of the input to pin 5 of IC2. Namely, if the input is L (low), pins 6 and 1 are in closed circuit, while in case of H (high) pins 3 and 6 are closed. As the input to pin 5 is SECAM 12 V, pins 3 and 6 become closed when SECAM 12 V enters pin 5.

(3) Pre-emphasis circuit

Pre-emphasis is applied to the high frequency portion of the signal during recording and de-emphasis during playback. This system serves to reduce noise due to magnetic tape and head characteristics at high frequencies.

(4) Frequency modulator

This is a type of astable multivibrator with input voltage determined by the video signal. It is designed to operate in the region from 3.8 MHz at the sync tip to 4.8 MHz at the white peak.

3.4.3 Luminance signal playback system

See luminance signal block diagram of Fig. 3-68.

1. Outline

During normal playback, the relay RY-1 on the HEAD board is energized, while RY-2 is de-energized. These states set the normal P.B. video heads for playback. The playback signals from the normal P.B. video heads go via Q6 or Q7 to the pre-amplifiers of IC2, which are designed for both impedance matching between the video heads and rotary transformers, and optimum S/N. Negative feedback damping is employed in order to minimize noise in the area of the head resonance point.

At the mixing amplifier in IC2, the CH-1 and CH-2 segments are joined into a continuous signal in accordance with the 25 Hz drum flipflop signal, which is synchronized to video head rotation. The playback FM signal is obtained from IC2 pin 10 and sent to the electronic switch IC3. This electronic switch selects between the normal playback and search (including slow and still) playback FM signals.

During Search, Slow and Still modes, RY-1 is de-energized, while RY-2 is energized. These states set the search P.B. video heads for playback, after which the signals from these video heads go via Q16 or Q17 to the pre-amplifiers of IC6.
IC6 functions in the same manner as IC2 and the playback FM signal is sent from IC6 pin 10 to the electronic switch IC5.

Since the down converted color signal is included at IC3 pin 6, in one route, the signal goes via LPF-1 to the color signal playback circuit. In another route for PAL/SECAM and NTSC the signal is differently treated between the both systems. In case of PAL/SECAM the signal is sent to Q8 to be equalized and then via Q10 of an emitter-follower to pin 1 of IC4 of an electronic switch. In case of NTSC the signal takes the same route as the former, namely, first to Q11 to be equalized and finally to pin 3 of IC4 (Elec. SW) via Q13 of an emitter-follower. The output of pin 6 of IC4 goes to pin 6 of IC5 (FM AGC).

The FM AGC circuit is used for precisely driving the dropout compensator (DOC). Dropout refers to intermittent loss of signal due to imperfections in the tape. When this occurs, the DOC inserts the signal from the previous horizontal scanning line, thereby minimizing visible effects in the picture.
If the playback FM signal is color, the corrected signal passes through the high-pass filter and is sent to the limiter of IC5. The limiter is used for precisely driving the demodulator and also functions to prevent black/white reversal.

The limited FM signal waveform becomes a precise square-wave and goes via the emitter-follower Q22 and connector P135 pin 1 to the demodulator of the luminance (Y) circuit. The limited FM signal from connector P115 pin 1 goes via R96 (limiter balance) to the demodulator in IC7 of the Y circuit. The demodulation is a phase detecting type using a delay line. The resulting luminance signal goes from IC7 pin 9 to Q11. The demodulated signal is amplified by Q11 and goes to a de-emphasizer which compensates its frequency characteristic (opposite characteristic of pre-emphasis in recording). The luminance signal goes via the emitter-followrs Q10.
In addition to functioning as an integrator, LPF-3 and LPF-4 reduce FM carrier leak.

The luminance signal is amplified by IC3, IC4, and goes to the noise canceller which consists of IC5, D3, D4 and mixing amplifier in IC7 for reducing high frequency noise. At the color mixing circuit, the luminance signal from the noise canceller is mixed with the playback color signal. This becomes the output through the electronic switch in IC7 and emitter-follower Q14.

The output of Q14 goes to the output circuit. The output signal goes via IC7 pin 18 to the amplifier, then via pin 20 to the emitter-follower Q16. Only during the Search, Slow and Still modes, mixing circuit Q18 adds the quasi-vertical sync pulse in order to prevent the vertical sync from being disturbed by noise. At these times, the negative 50 Hz V pulse is supplied from the drum servo circuit via connector P111 pin 3.
In normal playback the output of Q16 is sent to the S.R. amplifier of Q21 and Q22 after passing through the emitter-follower Q20 only.
However, in Search, Still and Slow modes, the output of Q16 goes to Q20 after being mixed with false pulse of Q18.

The output is branched into three lines. One of these goes to the VIDEO output connector of the rear panel at 75 Ω. The second goes to the TV monitor connector of the rear panel at 75 Ω. The third goes via EQ5, then is amplified and supplied to the RF converter for producing the RF output signal.

2. Circuit elements

(1) Dropout compensator

Defects in the tape, such as magnetic particle losses, can cause loss or reduction of the FM signal, which may impair picture quality. When this occurs, the dropout compensator functions to insert the FM signal from the previous horizontal line, thereby preventing visible effects in the picture.

The FM AGC circuit first corrects for level fluctuations in the playback FM signal, which arise from variations in head to tape contact at the intake and output of the rotating drum. This results in a fixed level as indicated by waveform (b) in Fig. 3-65.

Part of this output goes directly to the switching circuit, while another part is applied to the dropout detector. In the dropout detector circuit, a highpass filter cuts the low sideband of the FM signal and an integrator detects the dropout component. A precise squarewave is formed and supplied as waveform (c) to the switching circuit.

Part of the DOC output is always supplied through a 1-H delay line (DL1) and an amplifier to the switching circuit. When a dropout occurs, the waveform (c) becomes high and the switcher turns on. The delayed FM signal becomes inserted in place of the dropout component.

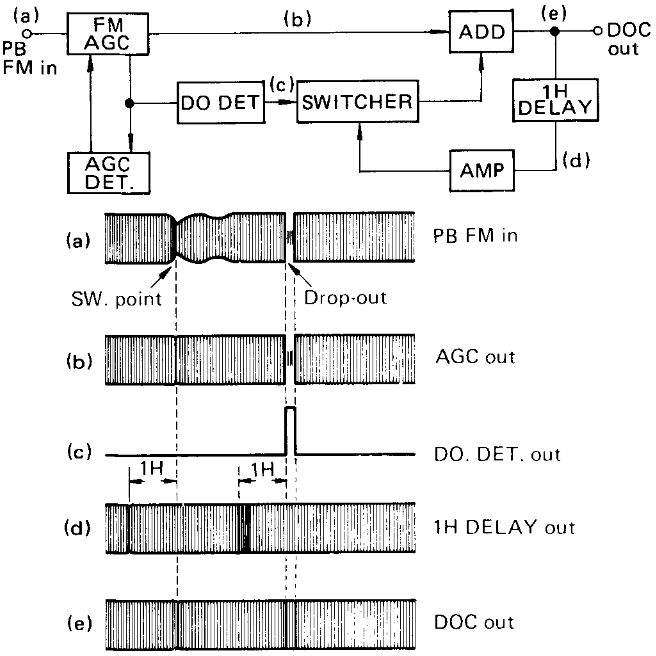

(a)
PB FM in
FM AGC
(b)
ADD
(e)
DOC out
(c)
DO DET
SWITCHER
1H DELAY
AGC DET.
AMP
(d)
(a)
PB FM in
SW. point
Drop-out
(b)
AGC out
(c)
1H
1H
DO. DET. out
(d)
1H DELAY out
(e)
DOC out

Fig. 3-65 Dropout compensator

(2) Demodulator circuit

Part of the signal from the limiter goes directly to the switching circuit as the switching pulse. In the other route the signal goes through a delay circuit, then to the switcher as waveform (b) in Fig. 3-66.

The delayed output through the inverter enters the switcher as waveform (c).

A low switching pulse (a) produces the switching circuit output shown by (b), while a high pulse results in (c). Consequently, the switching circuit output becomes as shown by waveform (d). This is integrated through a lowpass filter to yield the luminance signal indicated by (e).

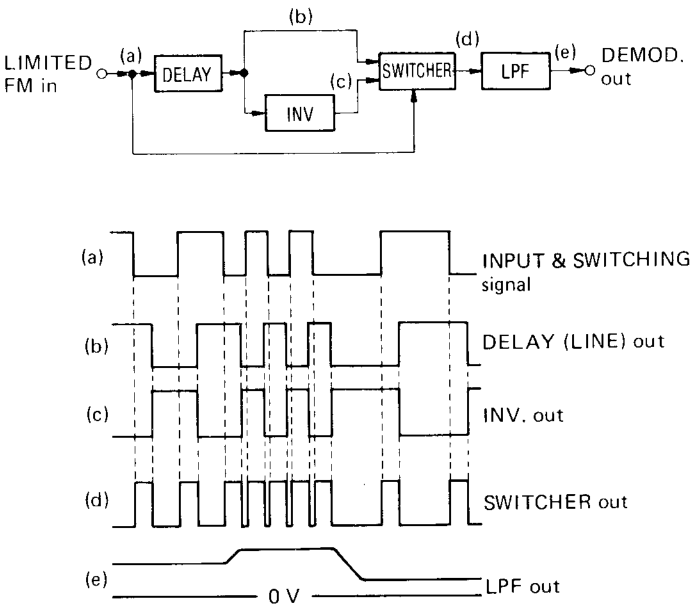

(b)
(d)
LIMITED FM in
(a)
DELAY
(c)
SWITCHER
LPF
(e)
DEMOD. out
INV
(a)
INPUT & SWITCHING signal
(b)
DELAY (LINE) out
(c)
INV. out
(d)
SWITCHER out
(e)
0 V
LPF out

Fig. 3-66 Demodulator principle

(3) Noise canceller circuit

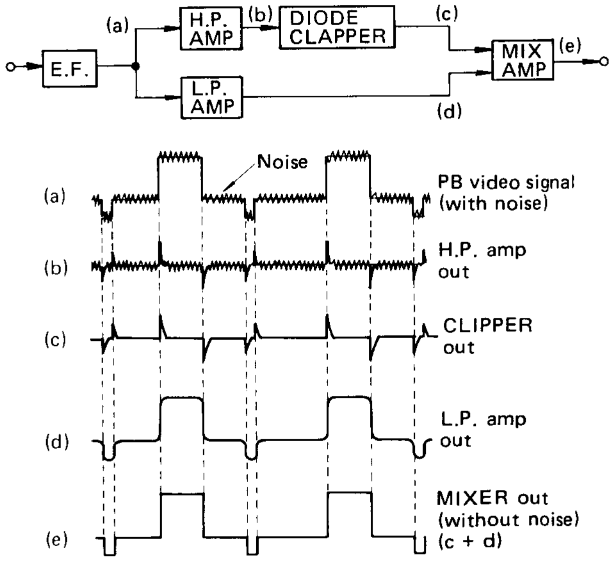

(a)
H.P. AMP
(b)
DIODE CLAPPER
(c)
E.F.
MIX AMP
(e)
L.P. AMP
(d)
Noise
(a)
PB video signal (with noise)
(b)
H.P. amp out
(c)
CLIPPER out
(d)
L.P. amp out
(e)
MIXER out (without noise) (c + d)

Fig. 3-67 Noise canceller principle

The signal playbed back from the tape contains FM noise at high frequencies, as indicated by (a) in Fig. 3-67. This is applied in two lines to highpass and lowpass amplifiers to become waveforms (b) and (d).

Noise in the plateau section of the video signal, which may easily affect the picture, becomes concentrated in the low level portion of the signal through the highpass amplifier. The diode clipper functions to remove this noise to produce waveform (c). Waveforms (c) and (d) are then mixed to yield noise free waveform (e).

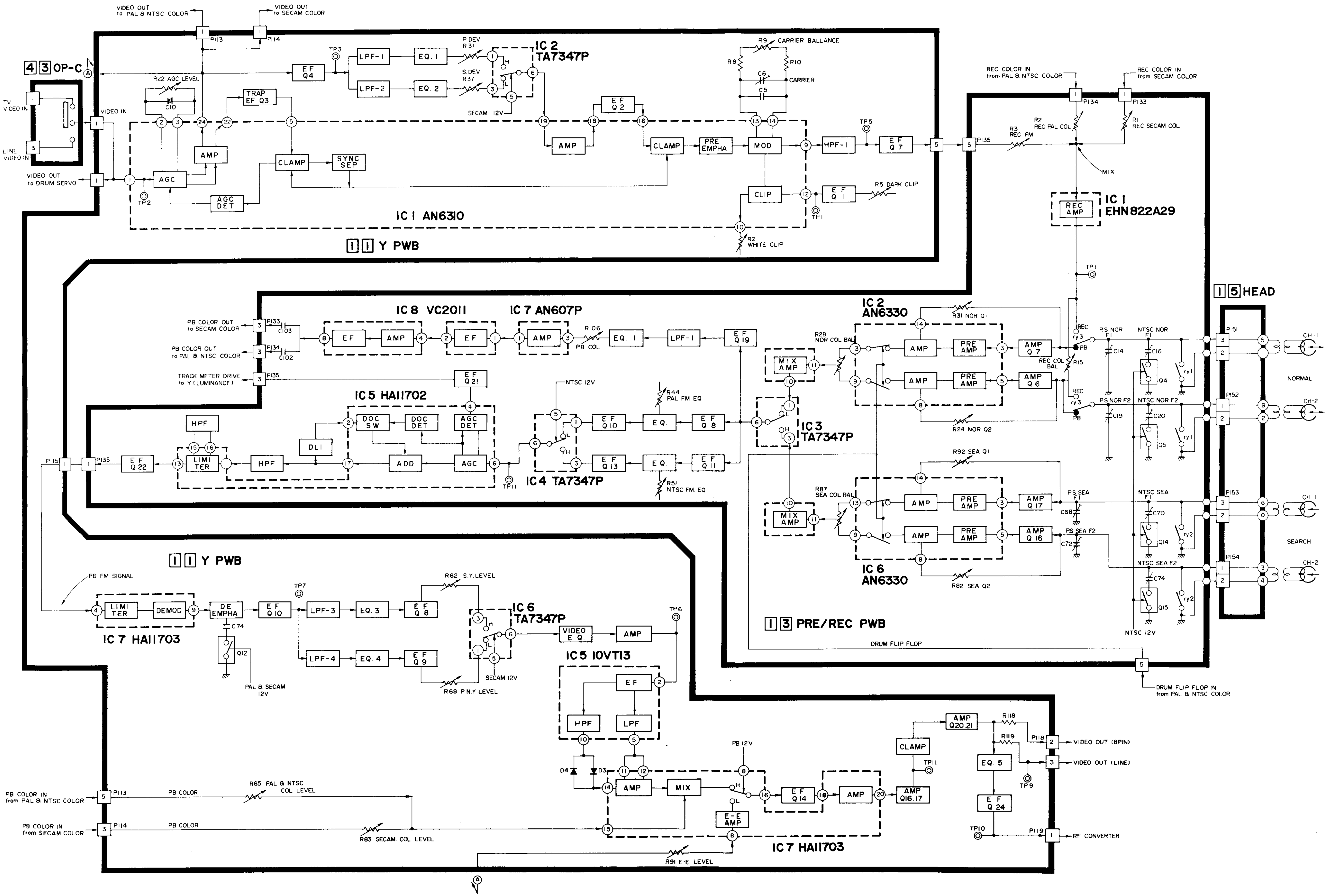
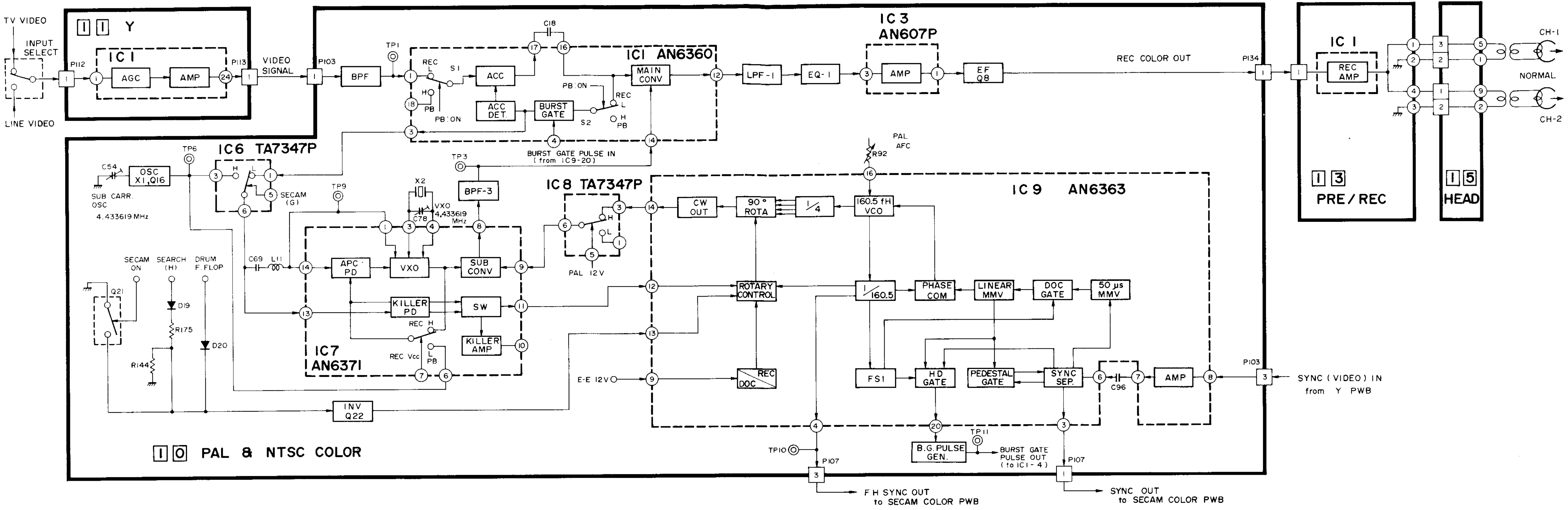

VIDEO OUT to PAL & NTSC COLOR
VIDEO OUT to SECAM COLOR
P113
P114
4 3 OP-C
TV VIDEO IN
LINE VIDEO IN
VIDEO IN
VIDEO OUT to DRUM SERVO
R22 AGC LEVEL
C10
AMP
AGC
AGC DET
TP2
TRAP EF Q3
CLAMP
SYNC SEP
EF Q4
TP3
LPF-1
EQ. 1
LPF-2
EQ. 2
P DEV R31
S DEV R37
SECAM 12V
IC 2 TA7347P
AMP
EF Q2
CLAMP
PRE EMPHA
MOD
CLIP
R9 CARRIER BALLANCE
R8
R10
C6
C5
CARRIER
HPF-1
TP5
EF Q7
EF Q1
R5 DARK CLIP
TP1
R2 WHITE CLIP
IC 1 AN6310
1 1 Y PWB
REC COLOR IN from PAL & NTSC COLOR
REC COLOR IN from SECAM COLOR
P134
P133
P135
R3 REC FM
R2 REC PAL COL
R1 REC SECAM COL
MIX
REC AMP
IC 1 EHN822A29
TP1
1 5 HEAD
PB COLOR OUT to SECAM COLOR
PB COLOR OUT to PAL & NTSC COLOR
TRACK METER DRIVE to Y (LUMINANCE)
C103
C102
IC 8 VC2011
EF
AMP
IC 7 AN607P
R106 PB COL
EQ. 1
LPF-1
EF Q19
EF Q21
IC 5 HA11702
HPF
LIMI TER
DOC SW
DOC DET
AGC DET
DLI
ADD
AGC
P115
EF Q22
TP11
NTSC 12V
IC 4 TA7347P
EF Q10
EF Q13
EQ.
EF Q8
EF Q11
R44 PAL FM EQ
R51 NTSC FM EQ
MIX AMP
IC 3 TA7347P
IC 2 AN6330
R28 NOR COL BAL
R31 NOR Q1
R24 NOR Q2
PRE AMP
AMP Q7
AMP Q6
REC COL BAL R15
REC ry3 PB
PS NOR F1
PS NOR F2
NTSC NOR F1
NTSC NOR F2
C14
C16
C19
C20
Q4
Q5
ry1
P151
P152
P153
P154
CH-1
CH-2
NORMAL
SEARCH
R92 SEA Q1
R87 SEA COL BAL
AMP Q17
AMP Q16
PS SEA F1
PS SEA F2
C68
C72
NTSC SEA F1
NTSC SEA F2
C70
C74
Q14
Q15
ry2
IC 6 AN6330
R82 SEA Q2
NTSC 12V
1 3 PRE/REC PWB
DRUM FLIP FLOP
DRUM FLIP FLOP IN from PAL & NTSC COLOR
1 1 Y PWB
PB FM SIGNAL
LIMI TER
DEMOD
IC 7 HA11703
DE EMPHA
C74
Q12
PAL & SECAM 12V
TP7
EF Q10
LPF-3
EQ. 3
EF Q8
LPF-4
EQ. 4
EF Q9
R62 S.Y. LEVEL
R68 P.N.Y LEVEL
IC 6 TA7347P
SECAM 12V
VIDEO E Q.
AMP
TP6
IC 5 10VT13
EF
HPF
LPF
D4
D3
PB 12V
AMP
MIX
E-E AMP
EF Q14
AMP
AMP Q16.17
CLAMP
TP11
AMP Q20.21
R118
R119
P118
EQ. 5
TP9
EF Q 24
TP10
P119
VIDEO OUT (8PIN)
VIDEO OUT (LINE)
RF CONVERTER
IC 7 HA11703
PB COLOR IN from PAL & NTSC COLOR
PB COLOR IN from SECAM COLOR
PB COLOR
R85 PAL & NTSC COL LEVEL
R83 SECAM COL LEVEL
R91 E-E LEVEL
A

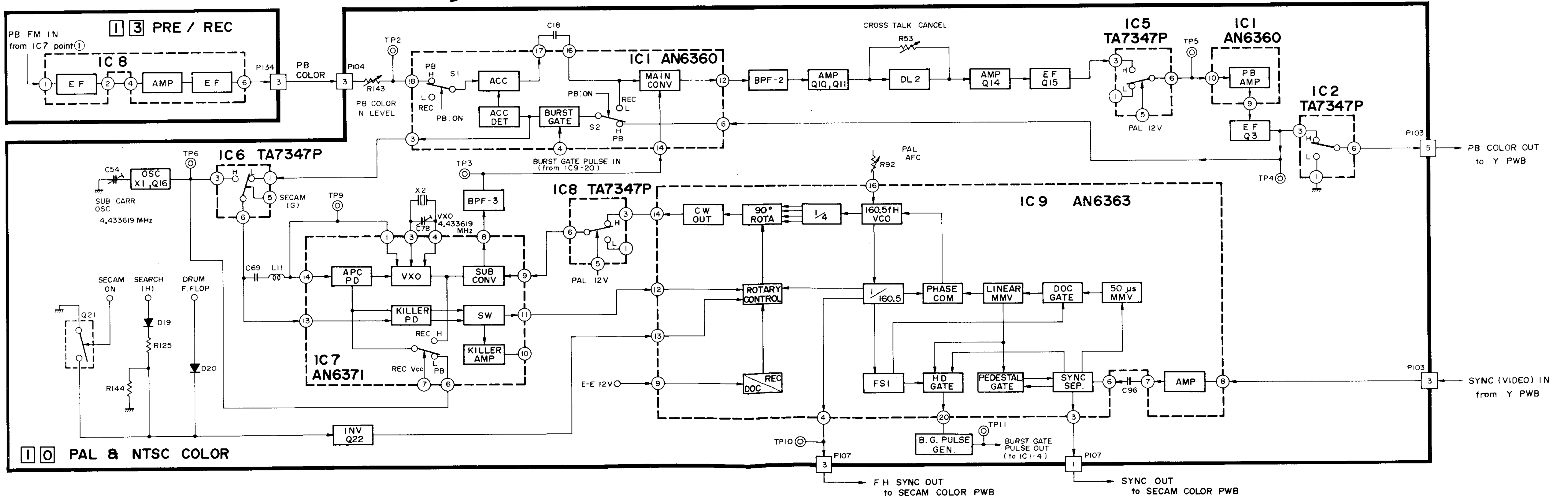
Fig. 3-68 Y. luminance signal block diagram

RECORDING COLOR SIGNAL PATH



TV VIDEO
INPUT SELECT
LINE VIDEO
1 1 Y
IC 1
AGC
AMP
P112
P113
VIDEO SIGNAL
P103
BPF
TP1
REC L S1 H PB
PB: ON
ACC
ACC DET
BURST GATE
C18
IC1 AN6360
MAIN CONV
PB: ON
REC L
S2
H PB
BURST GATE PULSE IN (from IC9-20)
IC3 AN607P
LPF-1
EQ-1
AMP
EF Q8
REC COLOR OUT
P134
IC6 TA7347P
TP6
C54
OSC X1,Q16
SUB CARR. OSC 4.433619 MHz
SECAM (G)
TP9
TP3
X2
VXO 4.433619 MHz
C78
BPF-3
C69 L11
APC PD
VXO
SUB CONV
KILLER PD
SW
KILLER AMP
REC H
REC Vcc
L PB
IC7 AN6371
SECAM ON
SEARCH (H)
DRUM F.FLOP
Q21
D19
R175
D20
R144
INV Q22
IC8 TA7347P
PAL 12V
E-E 12V
PAL AFC
R92
IC9 AN6363
CW OUT
90° ROTA
1/4
160.5 fH VCO
ROTARY CONTROL
1/160.5
PHASE COM
LINEAR MMV
DOC GATE
50 μs MMV
REC DOC
FS1
HD GATE
PEDESTAL GATE
SYNC SEP.
C96
AMP
P103
SYNC (VIDEO) IN from Y PWB
TP10
TP11
B.G. PULSE GEN.
BURST GATE PULSE OUT (to IC1-4)
P107
F H SYNC OUT to SECAM COLOR PWB
SYNC OUT to SECAM COLOR PWB
1 0 PAL & NTSC COLOR
IC 1
REC AMP
1 3 PRE / REC
CH-1
NORMAL
CH-2
1 5 HEAD

PLAY BACK SIGNAL PATH



PB FM IN from IC7 point ①
1 3 PRE / REC
IC 8
E F
AMP
E F
P134
PB COLOR
P104
R143
PB COLOR IN LEVEL
TP2
PB H S1 L REC
PB: ON
ACC
ACC DET
BURST GATE
C18
IC1 AN6360
MAIN CONV
PB: ON
REC L
S2
H PB
CROSS TALK CANCEL
R53
BPF-2
AMP Q10, Q11
DL 2
AMP Q14
EF Q15
IC5 TA7347P
PAL 12V
TP5
IC1 AN6360
PB AMP
EF Q3
IC2 TA7347P
TP4
P103
PB COLOR OUT to Y PWB
IC6 TA7347P
TP6
C54
OSC X1,Q16
SUB CARR. OSC 4.433619 MHz
SECAM (G)
TP9
TP3
BURST GATE PULSE IN (from IC9-20)
X2
VXO 4.433619 MHz
C78
BPF-3
C69 L11
APC PD
VXO
SUB CONV
KILLER PD
SW
KILLER AMP
REC H
REC Vcc
L PB
IC7 AN6371
SECAM ON
SEARCH (H)
DRUM F.FLOP
Q21
D19
R125
D20
R144
INV Q22
IC8 TA7347P
PAL 12V
E-E 12V
PAL AFC
R92
IC9 AN6363
CW OUT
90° ROTA
1/4
160.5fH VCO
ROTARY CONTROL
1/160.5
PHASE COM
LINEAR MMV
DOC GATE
50 μs MMV
REC DOC
FS1
HD GATE
PEDESTAL GATE
SYNC SEP.
C96
AMP
P103
SYNC (VIDEO) IN from Y PWB
TP10
TP11
B.G. PULSE GEN.
BURST GATE PULSE OUT (to IC1-4)
P107
F H SYNC OUT to SECAM COLOR PWB
SYNC OUT to SECAM COLOR PWB
1 0 PAL & NTSC COLOR

Fig. 3-69 PAL color signal block diagram

3.4.4 PAL color signal system

Refer to the color signal block diagram of Fig. 3-69.

1. Recording system

   Bandpass filter BPF1 separates the color signal component from the input video signal selected by the input select switch. Central energy of the color signal component is at the color subcarrier (4.433619 MHz) frequency.

   Without the luminance component, the color signal goes to IC1 pin 1 and via SW7 to the ACC circuit. This circuit controls the burst output for a fixed level, after which the signal is sent to the main converter via IC1 pins 17 and 16. Following is a brief outline of the ACC circuit operation.

   The color signal output of the ACC circuit goes to the burst gate.
   Via IC1 pin 4, the resulting burst gate pulse is applied to the burst gate. After sampling, the burst signal is peak rectified by the ACC detector and the pin 2 capacitor. The rectified voltage then controls the output level.
   The ACC output goes to the main converter for lowband conversion. Another input of the main converter comes from the subconverter via BPF3.

   Following is a brief outline of the AFC (automatic frequency control) loop.

   The sync (VIDEO) signal is supplied to IC9 pin 8. The white clip circuit clamps the sync tip to a fixed DC potential and clips the video signal, after which the next stage sync separator yields the separated sync signal component.
   The output of the sync separator (SYNC SEP)first passes through IC7 (from pin 3 to pin 1), and then goes to the SECAM COLOR circuit.

   The phase detector output is supplied to a 160.5 Fh VCO (voltage controlled oscillator) which oscillates at 160.5 times the horizontal sync frequency. This is counted down 1/4th to 40 Fh + 1/8 Fh and supplied to the 90° rotation circuit. The frequency is then returned to Fh and sent to the rotation control circuit and to the phase detector as the comparison signal.

   At the phase detector, the Fh derived from the horizontal sync of the input video signal is employed as the reference signal. Since this 15.625 kHz is stable and unvarying, the phase detector error output becomes zero. R92 (AFC) adjusts for precise 160.5 Fh oscillation of the VCO. Consequently, the VCO oscillates at 160.5 times the phase detector input reference signal frequency.

   As a result, the Fh from the 1/40.125th countdown circuit is in phase with the input H sync signal. This is supplied to the rotation control circuit. In this circuit, in addition to Fh, the 25 Hz drum flipflop signal, synchronized to the video head rotation, is supplied from the servo board via P105 pin 1 and Q22. The ID (identification) pulse from the irregular phase error corrector of the APC loop goes to IC9 pin 12, while the rotation control output goes to the 90° rotation circuit. In the rotation control process, the color signal is converted to lowband. Then without shifting CH-1 head component, the CH-2 head component is delayed in phase 90° every line and recorded. This necessitates the 25 Hz flipflop and H sync signals.

   After phase shifting, the 40 Fh + 1/8 Fh signal goes as the AFC loop output from IC9 pin 14 via IC7 pin 9 to the sub converter. Another input of the sub converter comes from the APC (automatic phase control) loop.

   Ordinarily, one input of IC7 APC detector is the REC burst signal from the burst gate via the 90° advance.
   The reason for not supplying the burst signal to the APC detector is that the phase of the signal does not fluctuate at this time and the frequency is an unvarying 4.433619 MHz. Therefore, the APC detector zero output goes to the VXO (variable crystal oscillator) which oscillates at Fs + 4.433619 MHz. This frequency is adjusted during recording by trimmer capacitor C78.

   Similarly, the burst signal is not supplied to the ID detector and the ID detector output becomes zero.

   In the above manner, the APC loop does not function in the recording mode, since the REC burst signal phase is stable and nonfluctuating. The resulting Fs from the APC loop. Through BPF3, the sum component of Fs + 40 Fh + 1/8 Fh is obtained and sent from IC1 pin 14 to the main converter as a single carrier frequency.

   At the main converter, the color signal with central energy at frequency Fs and the Fs + 40 Fh + 1/8 Fh from the sub converter are frequency converted to yield the difference component through a lowpass filter from IC1 pin 12. This produces the down converted color signal with center energy at 40 Fh + 1/8 Fh.

In the PRE/REC board R1 (REC SECAM COL) and R2 (REC PAL COL) adjust the color signal recording current, after which the signal is mixed with the FM luminance signal, amplified by REC amp-1 and REC amp-2, and supplied to the rotary transformer and video heads. The high frequency, high level FM luminance signal is recorded on the tape as AC bias.

During the PAL color mode, Q211 does not operate because pin 15 of IC10 (SECAM DETECTOR) has low potential.

3.4.5 PAL color signal playback system

1. Main signal path
   The signal played back by the video heads is amplified by IC2 or IC4, and applied to IC5 electronic switch. IC2, IC4 and IC5 operations are the same as for luminance signal playback.

   One output of IC5 electronic switch goes to the luminance (PAL, NTSC, SECAM) signal playback system, while the other is supplied to the color signal playback system via lowpass filter LPF-1. The filter attenuates the FM luminance signal and passes the down converted color signal. The playback color signal is amplified by IC7, then supplied via connector P134 pin 3 to the ACC (automatic color control) circuit of IC1 on the color circuit board. From IC1 pin 18, the playback color signal goes via an electronic switch to the ACC input.

   The ACC functions in the same manner as in recording to maintain a stable color burst level. The signal through the ACC circuit is supplied to the main converter for returning the color signal to its original frequency spectrum. However, the playback color signal includes frequency and phase errors introduced by such factors as variations in tape speed, irregularities in video head rotation and tape elasticity. Thus, the playback burst frequency becomes Fc' = Fh + 1/8 Fh ± Δf, Fh' is expressed by Fh ± Δh, which is frequency variation due to tape speed fluctuations. The AFC loop compensates for the large Fh' component, while the APC loop corrects for the smaller ±Δf component, which is phase variation due to rotational error and tape elasticity.

   At the sub-converter, the 40 Fh' + 1/8 Fh' from the AFC loop and 4.43 MHz from the APC loop are frequency converted. Bandpass filter BPF-3 separates the sum component of 4.43 MHz ± 40 Fh' + 1/8 Fh' ± Δf.

   The main converter outputs becomes the sum and difference frequencies of the playback color signal 40 Fh' + 1/8 Fh' ± Δf and bandpass filter output 4.43 MHz ± 40 Fh' ± 1/8 Fh' ± Δf. Bandpass filter BPF-2 passes only the difference frequency 4.43 MHz. This means frequency and phase errors included in playback color signal have become excluded.

   The burst de-emphasized signal is supplied via Q11 emitter-follower to delay line DL2, which functions to cancel color crosstalk. From DL2, the signal goes to pin 3 of IC5 of an electronic switch which distinguishes between PAL P.B. signal and NTSC P.B. one. When PAL 12 V High voltage enters pin 5, pins 6 and 3 are closed, while in case of Low voltage pins 6 and 1 are closed, on the other hand pin 1 receives NTSC color signal.

   The signal turned out of pin 6 of IC5 enters IC1 through pin 1 to be amplified and the amplified signal is again turned out of pin 9 to the emitter-follower Q3 where it is branched into two ways. One goes to the Y board as P.B. color signal after passing through IC2 and pin 5 of P103, the other to the burst gate after passing through pin 1 of IC1 electronic switch.

2. APC loop
   IC7 (AN6371) is used as APC (automatic phase control) in PAL & NTSC color system.
   Pins 2, 3 and 4 of IC7 is supplied with the reference signal of 4.433619 MHz from X'TAL-2. The signal picked out of the burst gate of IC1 is sent to pin 13 of IC7 via IC6 and then to the killer detector (KILLER DET) that distinguishes color signal from B/W signal and turns out H (high) in case of color and L (low) in B/W respectively through its pin 10.
   On the other hand, pin 14 also receives burst gate pulse and this is sent to APC DET.
   Into IC9 enters 40 Fh' + 1/8 Fh' ± Δf signal through pin 14 and it is mixed with the reference signal (4.433619 MHz) by the sub-converter. This mixed signal is sent to the main converter via BPF in the frequency of 4.43 MHz + 40 Fh' + 1/8 Fh' ± Δf.

3. AFC loop
   Circuit operation is the same as in the recording mode, i.e., the horizontal sync component of the luminance signal is detected in IC9, multiplied 40 times, shifted in phase and supplied to the sub converter. However, since the playback H sync frequency contains an error component, it becomes Fh' (= Fh ± ΔFh) and consequently 40 Fh' is supplied to the sub converter from the AFC loop.

4. Special circuit description

(1) APC and ID detector principles

From the crystal oscillator, fs (4.433619 MHz) is supplied as the reference signal to the APC and ID detectors. The phase is indicated by (a) of Fig. 3-70.

The playback burst signal forms the comparison signal supplied in the same phase to the ID detector. If phase error is absent, lines n and n + 1 becomes as shown by (b).

The 90° advance circuit of the APC detector yields waveform (c). Phase difference of the APC and ID detector outputs can be illustrated by the cosine curve of (d).

[APC detector]

With zero phase fluctuation in the playback burst signal (comparison signal), the APC detector output becomes as indicated in Fig. 3-71.

As indicated by (a), with respect to the burst reference signal input, the phase differences of lines n and n + 1 are 45° and 135° respectively. At this time, the APC detector output becomes as indicated by (b).

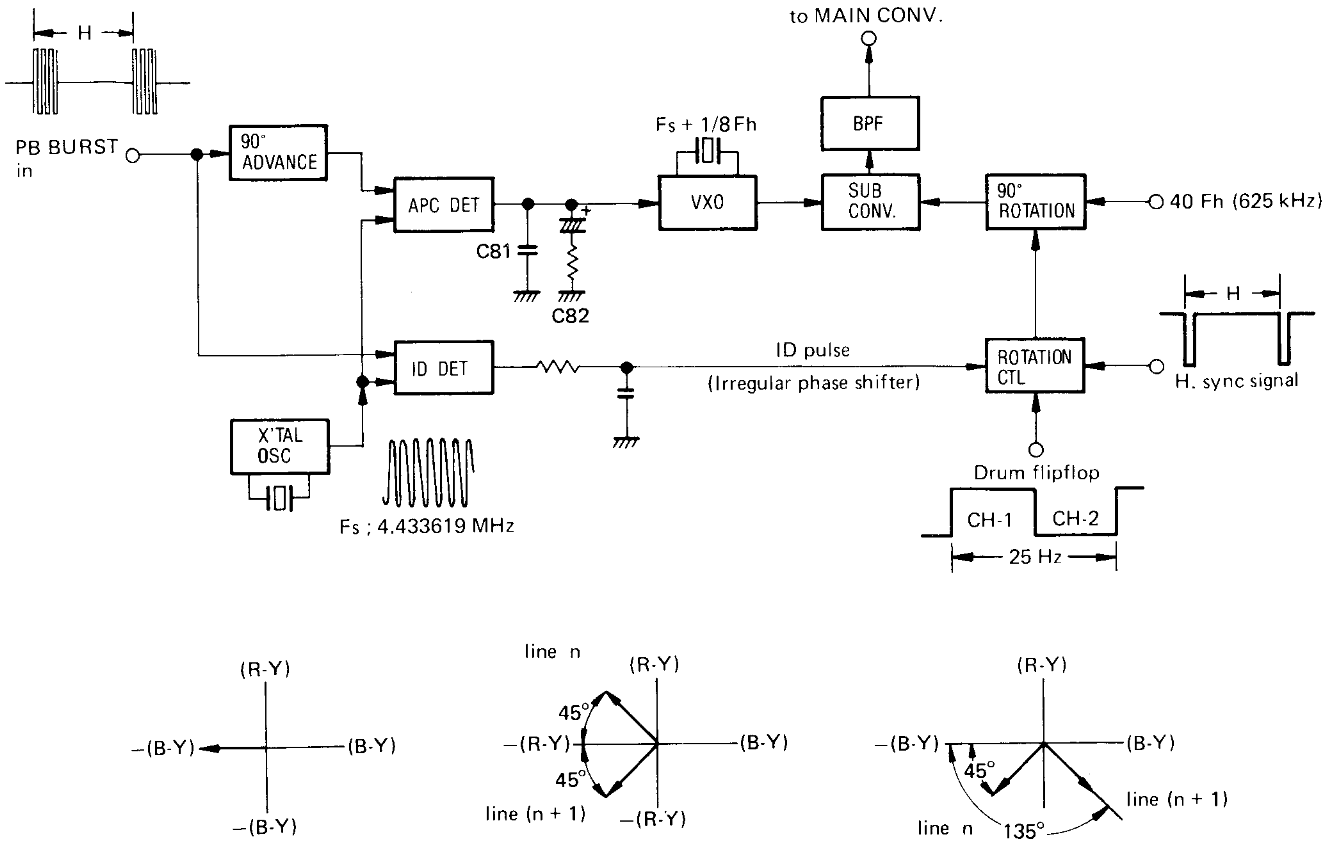
C81 and C82 smooth waveform (b) to yield the average voltage of lines n and n + 1. This is waveform (c).

The APC detector therefore operates according to the stability of (a) at 90°. In the case of a 90° advanced burst signal, as indicated by vector diagrams (a) and (b) of Fig. 3-70, the average phase difference of the reference crystal ocillator signal and the playback burst signal becomes locked to zero.

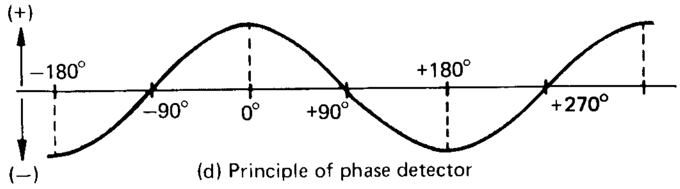
When phase error is absent from the input burst signal, the zero APC detector output goes to the VXO, which then oscillates at precisely the reference signal frequency of Fs + 1/8 Fh. This occurs during recording when the frequency and phase of the color signal are stable.

However, compensation is required in the playback process, due to the significant error components. For example, assume a 30° advance in the playback burst signal phase, as indicated in Fig. 3-72.

At this time, the APC detector outputs are +0.26 κ with respect to line n and –0.97 κ with respect to line n + 1. The average of the two lines becomes –0.36 κ, which goes to the VXO. In this manner, in order to avoid shifts in color hue, the APC detector output is not produced every line, but inserted, it becomes the average level of two lines.


H
PB BURST in
90° ADVANCE
APC DET
C81
C82
Fs + 1/8 Fh
VXO
to MAIN CONV.
BPF
SUB CONV.
90° ROTATION
40 Fh (625 kHz)
H
H. sync signal
ID DET
ID pulse
(Irregular phase shifter)
ROTATION CTL
X'TAL OSC
Fs ; 4.433619 MHz
Drum flipflop
CH-1
CH-2
25 Hz
(R-Y)
–(B-Y)
(B-Y)
–(B-Y)
line n
(R-Y)
45°
–(R-Y)
(B-Y)
45°
line (n + 1)
–(R-Y)
(R-Y)
–(B-Y)
(B-Y)
45°
line (n + 1)
line n
135°

(a) Vector of X'tal osc. output (b) Vector of PB burst signal (c) Vector of 90° ADVANCE output



(d) Principle of phase detector

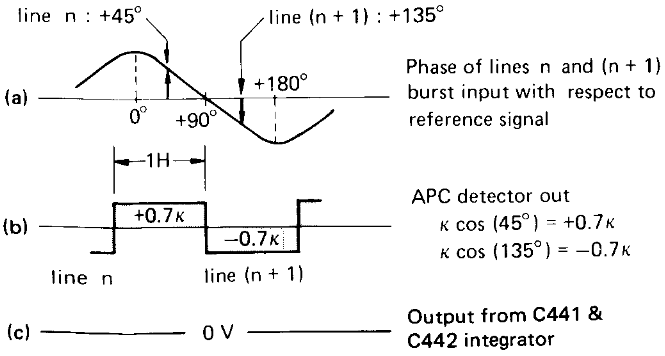
DET. ERROR VOLTAGE = $\kappa \cos(\theta_1 - \theta_2)$

κ ; constant

θ_1; input burst phase

θ_2; carrier (Fs) phase from X'tal oscillator

Fig. 3-70 APC detector and ID detector


line n : +45°
line (n + 1) : +135°
(a)
0°
+90°
+180°
Phase of lines n and (n + 1) burst input with respect to reference signal
1H
(b)
+0.7κ
–0.7κ
line n
line (n + 1)
APC detector out
κ cos (45°) = +0.7κ
κ cos (135°) = –0.7κ
(c)
0 V
Output from C441 & C442 integrator

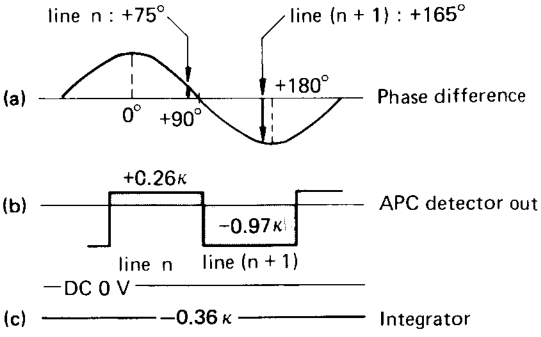

line n : +75°
line (n + 1) : +165°
(a)
0°
+90°
+180°
Phase difference
+0.26κ
(b)
–0.97κ
APC detector out
line n
line (n + 1)
–DC 0 V
(c)
–0.36κ
Integrator

Fig. 3-71 APC detector-1 (phase variation absent) **Fig. 3-72** APC detector-2 (phase variation present)

Fig. 3-73 illustrates the relationship between the APC detector output and VXO oscillator.

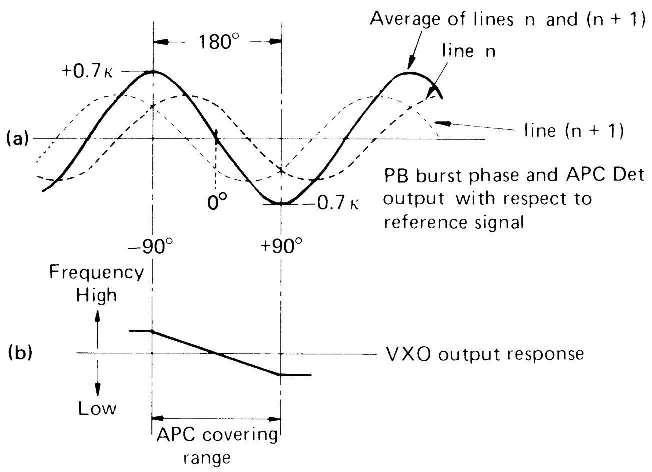


Fig. 3-73 APC det. and VXO relationship

The broken lines of (a) indicate the phase difference of lines n, n + 1 and the detector output with respect to the playback burst signal (90° advanced input) reference. Average output of lines n and n + 1 is shown by the solid line.

The average output becomes minimum when the phase is advanced 90° and maximum delayed 90°. At which time the VXO output frequency increases, in effect advancing the phase. The opposite is obtained with a low VXO input.

[ID detector]
As indicated in Fig. 3-73, the effective range of the APC detector is ±90° of the reference signal −(B−Y) axis. However, phase error exceeding this value occasionally arises due to dropout or switching noise. Therefore, the ID detector provides additional correction for the APC loop.

Fig. 3-74 illustrates the ID detector output.

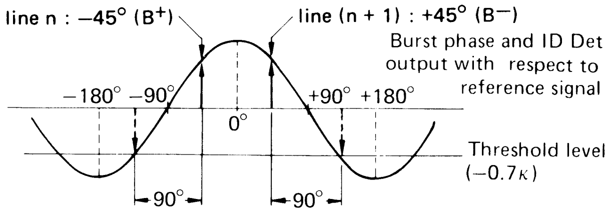


Fig. 3-74 ID detector

Low potential appears at the ID detector output only when line n is delayed more than 90° and line n + 1 advanced more than 90°. This goes to the rotation control circuit and delays the output of the 90° rotation circuit by 90° to perform APC compensation.

For example, if the playback burst signal is intermittently 180°, a 2H period of 90° and 90° becomes required. This compensates for color signal frequency error due to the tape transport system.

3.4.6 NTSC playback mode

As the operation principle in NTSC playback mode is mostly the same as in PAL system, the following is only the different matters from PAL. (See Fig. 3-75.)
Although IC9 (AN6363) is used as the AFC loop in PAL system, IC11 (AN6362) is used in NTSC. Secondly, in PAL system the signal from IC1 (Main Converter) goes to DL2 (2H Delay) after passing through BPF-2, while in NTSC the signal goes to DL1 (1H Delay) and then to IC4 (AN607P) in which the signal is amplified to be sent to pin 1 of IC5, which detects P.B. signal distinguishing between PAL and NTSC.
Regarding the phase of carrier color signal, the phase for CH-1 remains as it was but for CH-2 it is shifted −90° in recording and +90° in playback. The carriers for CH-1 and CH-2 are distinguished by the drum flip-flop. In NTSC, the phase for both CH-1 and CH-2 is shifted; namely, −90° for CH-1 in playback and +90° for CH-2 in the same. The carrier distinction is made by the drum flip-flop as well as in PAL.
VXO of APC is oscillated in 4.43 MHz as same as in PAL, consequently, the subcarrier frequency in NTSC playback mode is 4.43 MHz.

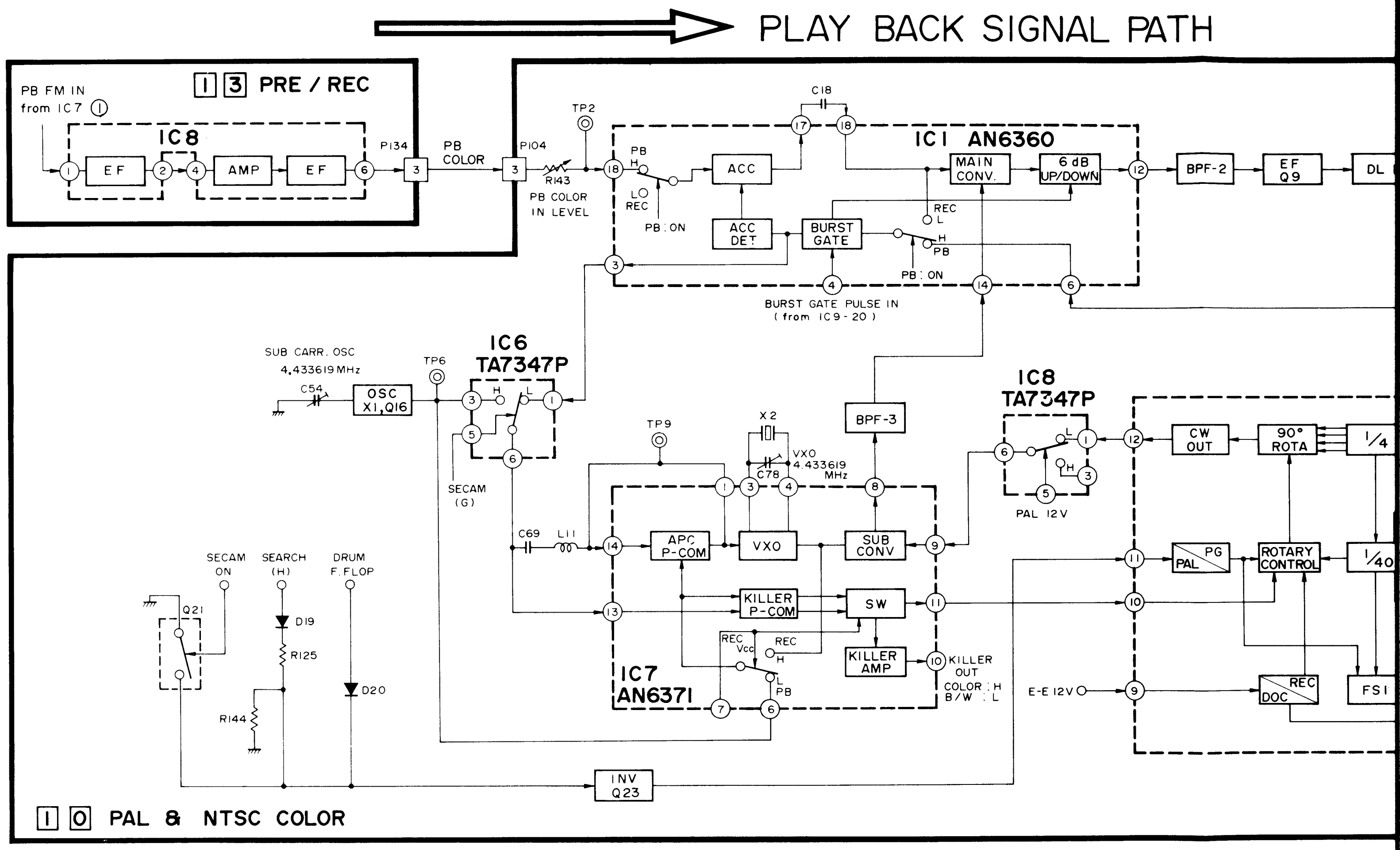

PLAY BACK SIGNAL PATH
1 3 PRE / REC
PB FM IN from IC7 ①
IC8
EF
AMP
EF
P134
PB COLOR
P104
R143
PB COLOR IN LEVEL
TP2
C18
IC1 AN6360
PB
H
L
REC
PB : ON
ACC
ACC DET
BURST GATE
MAIN CONV.
6 dB UP/DOWN
REC L
H PB
PB : ON
BURST GATE PULSE IN (from IC9 - 20)
BPF-2
EF Q9
DL
SUB CARR. OSC 4,433619 MHz
C54
OSC X1,Q16
TP6
IC6 TA7347P
SECAM (G)
TP9
X2
VXO 4.433619 MHz
C78
BPF-3
IC8 TA7347P
PAL 12V
CW OUT
90° ROTA
1/4
C69
L11
APC P-COM
VXO
SUB CONV
KILLER P-COM
SW
KILLER AMP
REC Vcc
REC H
L PB
IC7 AN6371
KILLER OUT COLOR : H B/W : L
PAL PG
ROTARY CONTROL
1/40
E-E 12V
REC DOC
FSI
SECAM ON
SEARCH (H)
DRUM F.FLOP
Q21
D19
R125
R144
D20
INV Q23
1 0 PAL & NTSC COLOR

Fig. 3-75 NTSC color signal block diagram

t signal is inter-
0° and 90° be-
for color signal
nsport system.

ayback mode is
ollowing is only
. 3-75.)
FC loop in PAL
C. Secondly, in
Converter) goes
gh BPF-2, while
lay) and then to
lified to be sent
al distinguishing

al, the phase for
shifted –90° in
arriers for CH-1
um flip-flop. In
CH-2 is shifted;
l +90° for CH-2
de by the drum

same as in PAL,
in NTSC play-

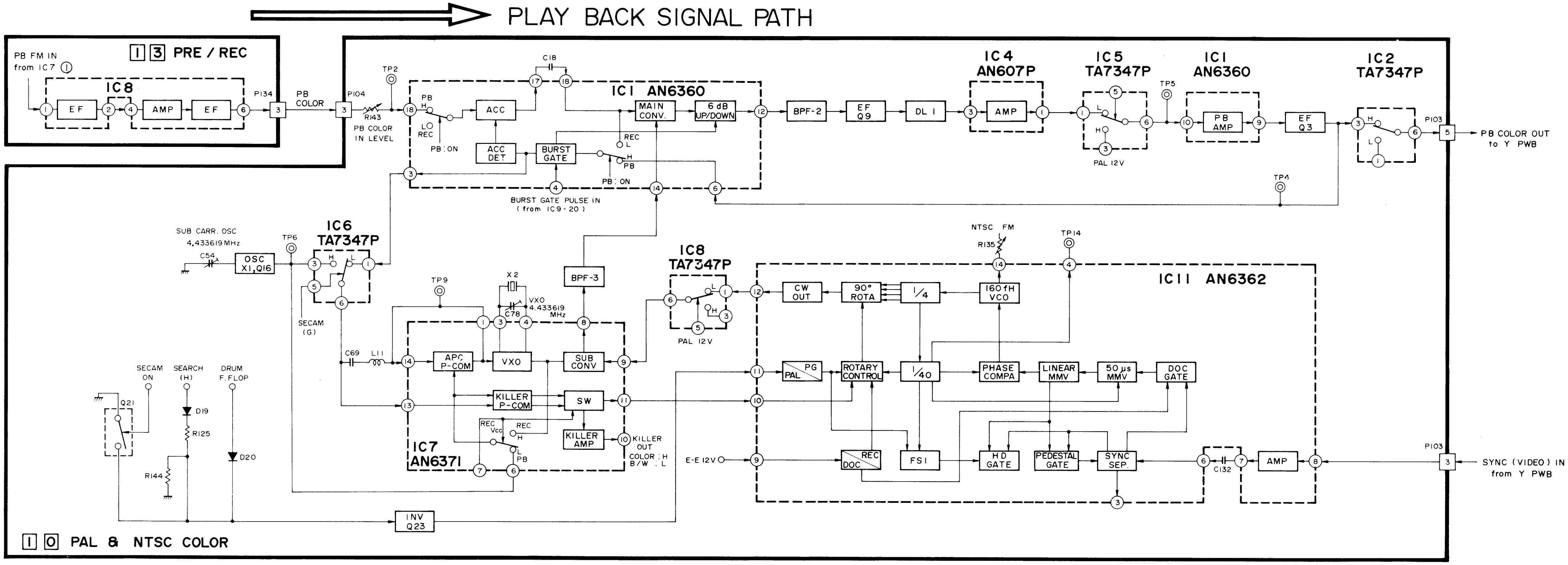

PLAY BACK SIGNAL PATH
1 3 PRE / REC
PB FM IN from IC7 ①
IC8
EF
AMP
EF
P134
PB COLOR
P104
R143
PB COLOR IN LEVEL
TP2
C18
IC1 AN6360
PB
H
L
REC
ACC
ACC DET
PB : ON
BURST GATE
MAIN CONV.
6 dB UP/DOWN
REC
L
H
PB
PB : ON
BURST GATE PULSE IN (from IC9 - 20)
BPF-2
EF Q9
DL 1
IC4 AN607P
AMP
IC5 TA7347P
PAL 12V
TP5
IC1 AN6360
PB AMP
EF Q3
IC2 TA7347P
TP4
P103
PB COLOR OUT to Y PWB
SUB CARR. OSC 4.433619 MHz
C54
OSC X1,Q16
TP6
IC6 TA7347P
SECAM (G)
TP9
X2
VXO 4.433619 MHz
C78
BPF-3
IC8 TA7347P
PAL 12V
C69
L11
APC P-COM
VXO
SUB CONV
KILLER P-COM
SW
KILLER AMP
REC Vcc
REC
H
L
PB
IC7 AN6371
KILLER OUT
COLOR : H
B/W : L
SECAM ON
SEARCH (H)
DRUM F.FLOP
Q21
D19
R125
R144
D20
INV Q23
NTSC FM
R135
TP14
IC11 AN6362
CW OUT
90° ROTA
1/4
160 fH VCO
PG PAL
ROTARY CONTROL
1/40
PHASE COMPA
LINEAR MMV
50 μs MMV
DOC GATE
E-E 12V
REC DOC
FS1
HD GATE
PEDESTAL GATE
SYNC SEP.
C132
AMP
P103
SYNC (VIDEO) IN from Y PWB
1 0 PAL & NTSC COLOR

Fig. 3-75 NTSC color signal block diagram

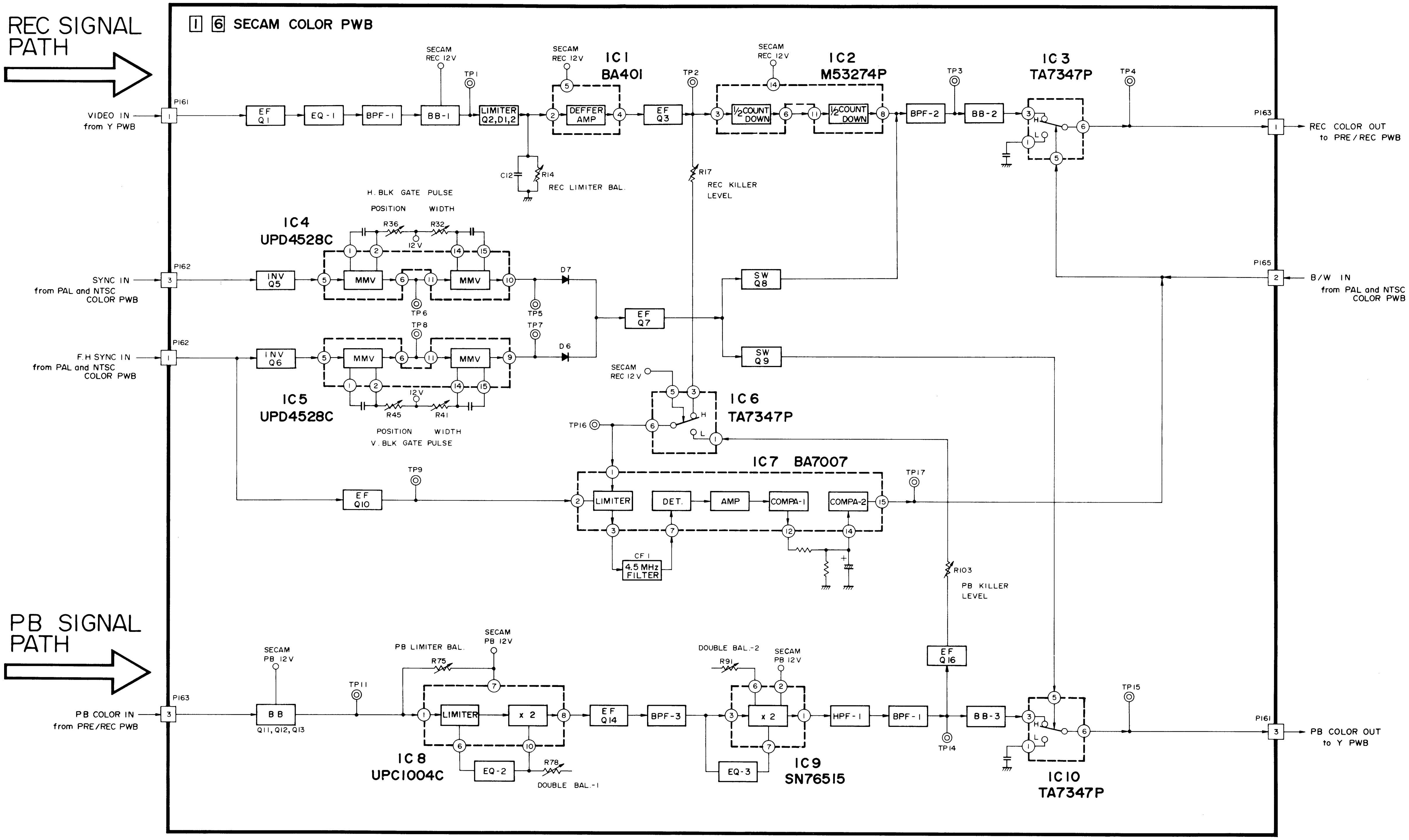

REC SIGNAL PATH
PB SIGNAL PATH
1 6 SECAM COLOR PWB
VIDEO IN from Y PWB
P161
EF Q1
EQ-1
BPF-1
BB-1
SECAM REC 12V
TP1
LIMITER Q2,D1,2
C12
R14
REC LIMITER BAL.
IC1 BA401
DEFFER AMP
EF Q3
TP2
R17
REC KILLER LEVEL
IC2 M53274P
1/2 COUNT DOWN
1/2 COUNT DOWN
BPF-2
BB-2
TP3
IC3 TA7347P
TP4
P163
REC COLOR OUT to PRE/REC PWB
H.BLK GATE PULSE
POSITION
WIDTH
R36
R32
12V
IC4 UPD4528C
SYNC IN from PAL and NTSC COLOR PWB
P162
INV Q5
MMV
MMV
TP6
D7
TP5
EF Q7
SW Q8
SW Q9
P165
B/W IN from PAL and NTSC COLOR PWB
F.H SYNC IN from PAL and NTSC COLOR PWB
INV Q6
TP8
TP7
D6
IC5 UPD4528C
R45
R41
V.BLK GATE PULSE
SECAM REC 12V
IC6 TA7347P
TP16
IC7 BA7007
TP9
EF Q10
LIMITER
DET.
AMP
COMPA-1
COMPA-2
TP17
CF1
4.5MHz FILTER
R103
PB KILLER LEVEL
EF Q16
PB COLOR IN from PRE/REC PWB
SECAM PB 12V
BB Q11, Q12, Q13
TP11
PB LIMITER BAL.
R75
IC8 UPC1004C
LIMITER
x 2
EQ-2
R78
DOUBLE BAL.-1
EF Q14
BPF-3
DOUBLE BAL.-2
R91
IC9 SN76515
x 2
EQ-3
HPF-1
BPF-1
TP14
BB-3
IC10 TA7347P
TP15
P161
PB COLOR OUT to Y PWB

Fig. 3-76 SECAM color signal block diagram

3.4.7 Chroma signal recording system

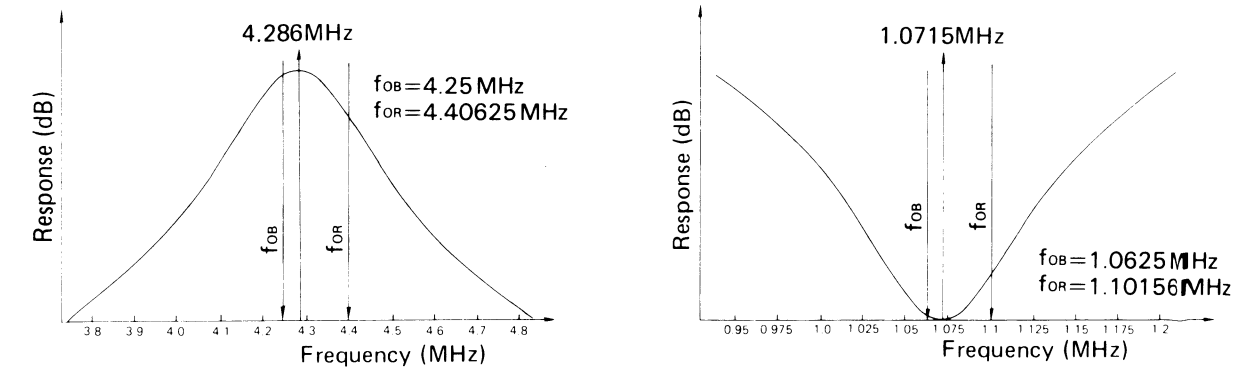
Refer to the color signal block diagram of Fig. 3-76.

A bandpass filter separates the chroma component from the video signal obtained from the Y amplifier. In the SECAM system, the chroma component is RF pre-emphasized by a bell filter in order to reduce interference between chroma and luminance components. Since this prevents uniform limiting and subsequent 1/4th count down, de-emphasis therefore applied by bell block 1, after which a signal with flat frequency response is amplified by Q2 and supplied to pin 1 of IC1. Limiting is applied at this point to maintain a fixed level. Chroma signal of 4.3 MHz ± 1 MHz with flat fixed level can then be obtained from pin 4 of IC1. This signal buffer Q4 to IC2 where frequency is counted down 1/4th. 1.1 MHz chroma signal is then obtained from pin 8. The other output goes via emitter follower Q3 to the color killer circuit.

Since noise would become amplified if limiting were applied during horizontal blanking (where burst and signal are absent), the noise gate H pulse is applied to the IC2 output signal.
The noise gate H and V pulses are formed from sync pulse after passing through IC4 and IC5 monostable multivibrators.
After determining pulse position and width, H pulse is applied to noise gate Q8 for removing noise from the blanking period.
Chroma signal is supplied to bandpass filter BPF-2. It is again RF pre-emphasized by bell block 2 and supplied to the PRE & REC board. The signal is then mixed with FM luminance and supplied to the REC amplifier.

3.4.8 Chroma signal playback system

Since the playback signal from the PRE/REC board has been RF pre-emphasized during recording by bell block 2, uniform limiting cannot be applied to the entire band. Therefore, the signal is de-emphasized by bell block for return to a flat frequency characteristic. The de-emphasized signal is supplied to pin 1 of IC8 which forms a limiter and 2X multiplier circuit. The output signal of pin 8 becomes a 2.2 MHz center frequency signal. After passing through Q14 and BPF-3, the signal is again applied to a 2X multiplier circuit, IC9 and EQ3. In this manner, the signal becomes a chroma signal with 4.4 MHz center frequency.
In the same manner as during recording, the noise gate H and V pulses are added to remove noise during the blanking interval.
The 4.3 MHz ± 1 MHz chroma signal with noise removed is RF pre-emphasized by bell block 3, then supplied to Y board for mixing with the playback luminance signal to become a SECAM type signal.



(a) Bell clock 1

(b) Bell clock 2

Fig. 3-77 Bell block 1 and 2

3.4.9 SECAM detector

As described earlier, the color signal circuit of this model is basically designed for recording a PAL color TV signal. A down converted, phase shifted direct recording system is used for PAL.

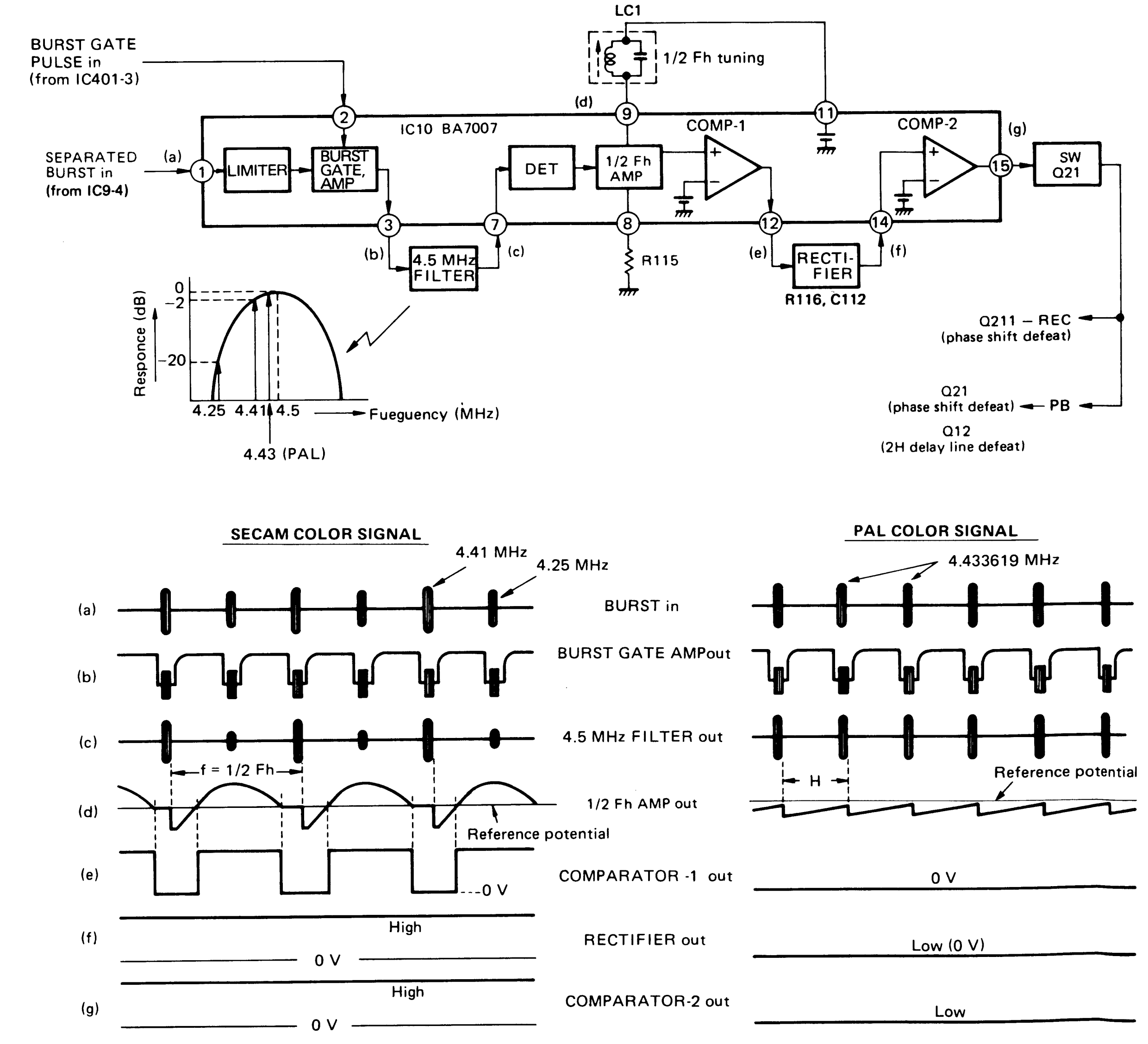
Models specifically designed for SECAM generally employ a 1/4 countdown direct recording system. However, this model records the SECAM signal by using the down converted system.

In this process, the SECAM signal is frequency modulated and sent through a bell filter. Since no effect is imparted on the phase error, the phase shift system for PAL recording becomes meaningless, and the signal is simply converted to lowband and recorded.

Line correction in the tape pattern reduces crosstalk during playback and the 2H delay line system for PAL is not employed. The SECAM detector circuit distinguishes between PAL and SECAM signals. With a SECAM signal, the phase shift and 2H delay line circuit are cutoff.

Refer to the block diagram of Fig. 3-78.

During both recording and playback, the burst signal sampled by IC1 burst gate is sent from pin 3 to IC10 limiter. The SECAM burst signal alternates every line between 282 Fh (4.40625 MHz) and 272 Fh (4.25 MHz) and after passing through the bell filter, the resulting burst level is not fixed. For this reason, the limiter shapes the waveform to produce a fixed level squarewave, which goes to the burst gate amplifier.



BURST GATE PULSE in (from IC401-3)
SEPARATED BURST in (from IC9-4)
(a)
LIMITER
BURST GATE, AMP
IC10 BA7007
LC1
1/2 Fh tuning
(d)
DET
1/2 Fh AMP
COMP-1
COMP-2
(g)
SW Q21
(b)
4.5 MHz FILTER
(c)
R115
(e)
RECTI-FIER
(f)
R116, C112
Q211 – REC (phase shift defeat)
Q21 (phase shift defeat) ← PB
Q12 (2H delay line defeat)
Responce (dB)
0
-2
-20
4.25
4.41
4.5
Fueguency (MHz)
4.43 (PAL)
SECAM COLOR SIGNAL
4.41 MHz
4.25 MHz
PAL COLOR SIGNAL
4.433619 MHz
(a)
BURST in
(b)
BURST GATE AMPout
(c)
4.5 MHz FILTER out
f = 1/2 Fh
H
Reference potential
(d)
1/2 Fh AMP out
Reference potential
(e)
COMPARATOR -1 out
0 V
(f)
High
0 V
RECTIFIER out
Low (0 V)
(g)
High
0 V
COMPARATOR-2 out
Low

Fig. 3-78 SECAM detector

The burst gate pulse is also routed to the burst gate from IC401 pin 18. The circuit removes components other than the burst which were amplified by the limiter. This output goes to the 4.5 MHz filter as waveform (b). The filter possesses the response indicated in the block diagram and passes the 282 Fh burst component, while attenuating the 272 Fh component. Waveform (c) illustrates the filter output.

Consequently, 4.5 MHz filter enhances the 282 Fh and attenuates the 272 Fh. The result is integrated by DET and the 1/2 Fh output is supplied to the 1/2 Fh amplifier.

The 1/2 Fh component is amplified and the Fh component attenuated by the L414, 1/2 Fh tuning circuit to produce waveform (d). This output is supplied to the comparator-1 non-invert input. The constant potential is supplied to the invert input as a reference signal for the comparator.
At this time, when the voltage at the non-invert input from the 1/2 Fh amplifier exceeds the reference voltage (about 6 V), the comparator-1 high output goes from pin 12 to the rectifier. When below the reference voltage, the comparator output becomes a low potential. Waveform (e) illustrates the comparator-1 output. This is full-wave rectified by R116 & C112 to yield waveform (f). The rectifier high output is supplied to the comparator-2 to yield waveform (g). In case of SECAM signal the output of pin 15 of IC10 becomes H (high), which drives Q21.

When a PAL signal is received, the burst frequency becomes fixed at 4.433619 MHz every line. At this time, detector output is Fh, the 1/2 Fh amplifier output becomes a low potential, and Q21 does not operate owing to low potential at its base.

In the case of SECAM recording, the output of Q21 becomes high, and this results in cutting off Q22. The 25 Hz drum flipflop signal becomes dropped to ground potential, defeating the phase shift circuit of the CH-2 head component.

During playback, the phase shift circuit is defeated by setting electronic switches Q22 off and Q12 on, preventing supply of the 2H delay line output to the mixer.
Only the bypass output from Ra goes to the mixer, thus avoiding adverse effects on the SECAM color FM signal due to mixing.

3.5 AUDIO SYSTEM

The video magnetic tape pattern is formatted to be able to record and replay CH-1 and CH-2 tracks. Two-channel audio track and DOLBY system are adopted in this model for improving audio quality.

CH-1 has three audio inputs, and two of them are used for selection of the line audio signal and the TV audio signal, which are applied through the switch (INPUT SELECT) located on the front panel. The other one is the audio microphone input signal applied through the microphone jack.

CH-2 has two audio inputs, and one of two is the line audio signal and the other one is the audio microphone signal applied through the microphone jack. While audio is recorded after video recording is completed, audio recording can be performed to CH-1 or CH-2 by selecting the AUDIO DUBBING SELECT switch.

As the circuit constitutions of CH-1 and CH-2 are the same except CH-1 can select the input signal of TV or line with the INPUT SELECT switch at the recording, the following explanation is made by using the example of CH-1 block diagram.

3.5.1 Recording system

When the recording mode is selected, a low input voltage is applied to the connector P411-1 (AUDIO EE) and P411-2 (AUDIO REC) by the SYSCON circuit board. The low input voltage of AUDIO EE makes the transistor Q23 ON, supplies high voltage to the pins 7 of IC3 and IC6 through the diodes D11 and D12 and makes the recording mode. The other low input of AUDIO REC is divided into two systems.

One supplies low voltage to the transistor Q22, makes Q22 ON and supplies high voltage to the pin 8 (VCC) of OSC BLOCK.

The other supplies low voltage to the transistor Q24 (for Bias Oscillator Control), makes Q24 off, supplies high voltage to the pin 7 (BIAS CONTROL) of OSC BLOCK and the oscillation frequency is outputted by the pins 1 and 2 of the OSC BLOCK.

If both the line and the microphone inputs are connected simultaneously at recording, both audio signals are recorded with mixture. The following description is made for the line audio input signal here:

The audio signal of TV broadcasting is supplied –20 dBs audio output signal by the pin 1 of the 8 pins connector (REAR circuit board 4 7), divided by the resistors R1 and R2 and –27.0 dBs approx. audio output signal is supplied to the input select switch of the front panel.

The audio input signal applied by an external (line) audio equipment is supplied to the input selection switch via the input level switch (–6 dBs, –20 dBs) which can select the input level.

The audio input signal selected by the input selector switch is divided by the resistors R401, R402 and R403, and the audio input signal of –27 dBs approx. is attenuated to –37 dBs approx. by the resistor divider R2 and R4 through the connector 404-1. This attenuated input signal is supplied to the RECORDING LEVEL variable resistor. The gain margin of this variable resistor is approximately 12 dB for the standard level.

The audio input signal adjusted by the variable resistor is applied to the pin 13 of REC LINE AMP IC13 via the connector 403-2 and the transistor Q1 (LIMITER), amplified to –30 dBs approx. and outputted by the pin 6 of IC1 through the electronic switch of inside IC1.

This output signal is applied to the pin 5 of IC2 (BUFFER AMP) and outputted by the pin 6. Then the output signal is applied to the Horizontal (H) Trap, where 15.625 kHz is attenuated and supplies output to the pin 2 of IC2. (IC2 contains DOLBY noise reduction circuit and processes signals at recording and playback. If the NOISE REDUCTION switch of the control box is set to OFF; the voltage of the pin 14 of IC2 becomes higher, the DOLBY circuit does not operate.)

The output signal is amplified up to –4 dBs approx. by the IC2 and divided into two of the pin 3 and the pin 7 of IC2.

The audio output signal of the pin 7 is applied to the CH-1 REC LEVEL variable resistor (R48) has an adjustable range of –5 dBs approx. to –26 dBs. The lower frequency component of the adjusted audio output signal is relatively boosted up by R49 (4.7 kΩ) and C43 (0.47 μF) and applied to the REC AMP (Q5). For compensation of higher frequency range loss at recording and playback of the magnetic tape, the REC AMP tunes to 12 kHz with VR53 (330 Ω) L3 (6.8 mH) and C45 (0.027 μF), gains approximately 16 dB and equalizes. The REC AMP supplies constant current to the head via R56 after blocking DC components by C46 so that constant recording current can supply independently from the audio signal frequency.

The output level of the REC AMP is –4.0 dBs approx. and this signal is mixed with 45 Vp-p AC bias of 70 kHz ± 5 kHz supplied from the BIAS OSC, then supplied to the audio head.

The other audio output signal of the pin 3 is supplied to the pin 10 of the electronic switch IC1, outputted by the pin 9 of IC1 and supplied to the pin 13 of the MUTING circuit IC7, which prevents shock noise generated at switching of recording and playback or power ON and OFF. The audio output signal outputted by the pin 12 of IC7 is applied to the pin 6 of AMP IC8. After amplification up to −1.0 dBs approx. at IC8, the audio output signal is outputted by the pin 7 of IC8 and divided into three.

One output signal is supplied to the METER ADJUST variable resistor (201) via the diode D21, adjusts R201 so the level meter as to indicate 0 dB and supplied to the level meter through the connector 417-1.

The second audio output signal, which is amplified approximately by 1.0 dB is divided and attenuated to −6 dBs approx. by R184 and R188 and is supplied to the LINE OUT through the connector 412-2. The third signal is supplied to the pin 9 of the electronic switch IC9, outputted by the pin 8 of IC9 and supplied to the MIXING AMP (Emitter follower) Q26.

This audio output signal is supplied to the pin 10 of IC7, amplified up to 0 dBs approx., outputted by the pin 9 of IC7 and divided into three more signals.

The first one is supplied to the MONITOR OUT and the 8 PIN OUT through the connector 420-1.

The second one is supplied to the RF CONV through the connector 413-1.

The last one is supplied to the pin 11 of the electronic switch IC9 and divided and attenuated to −10 dBs approx. by R191 and R193. The attenuated audio output signal is supplied to the pin 7 of IC7, amplified to −7 dBs approx. and outputted by the pin 8 of IC7. Then, the signal is divided by R179 and R190, attenuated to −10 dBs approx. and supplied to the HEAD PHONES through the connector 414-1.

3.5.2 Playback system

At playback mode, the voltage of the pin 7 of IC3 becomes lower to become the playback mode.

Very low level signal of −78 dBs approx. (400 Hz) is supplied to the PRE AMP Q7 and Q8 through the connector 401-2. The signal, amplified up to −45 dBs in the pre-amplifier is supplied to pin 2 of the playback equalizer IC1. The playback equalizer amplifier determines the equalizing characteristics obtained by negative feedback system, which is composed of R26, C28, R25 and C17.

Variable resistor R28 is used for adjusting the response at high frequency range. The signal is amplified up to −40 dBs approx., and supplied to the P.B. LEVEL variable resistor (R30) by the pin 6 of IC1 via P.B. LINE AMP and the electronic switch inside of IC1. The playback output signal is adjusted in the range of −30 dBs approx. to −40 dBs by R30 and supplied to the pin 5 of BUFFER AMP IC2.

The succeeding circuit operation is the same as the recording system except Q4 is OFF.

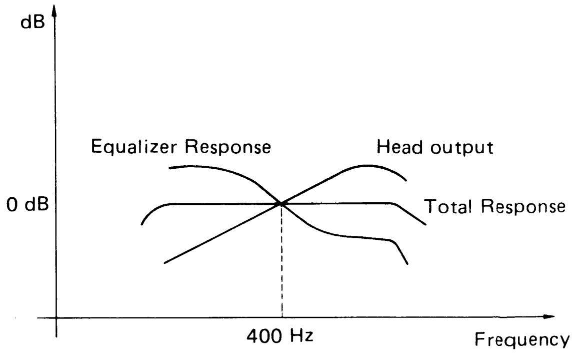


Fig. 3-79 Playback equalization response curves

3.5.3 Audio dubbing system

In audio dubbing mode, the new audio signal is recorded into another channel. While in this mode, one channel is in the playback mode and play back the pre-recorded signal. Information in the recorded channel, which is assigned by the audio dubbing channel selection switch on the front panel, is inputted to AUDIO PWB from P412 via the junction PWB.

The following description is given by assuming CH-1 for recording and CH-2 for playback mode:

When the AUDIO DUBBING mode is selected, a low input voltage is applied to the connector P412-1 (AUDIO-1) through the SYSCON circuit board. The low input voltage is divided and applied into two systems. One of the divided input is applied to the diode D16, makes D16 and the transistor Q19 ON and drives the relay 1 to select AR (AUDIO DUBBING) side. The other input makes the transistor Q21 ON, supplies high voltage to the pin 7 of IC3 through the diode D11, makes CH-1 REC mode and drives the relay 2 to select CH-1 (AUDIO TRACK) side.

The other low input from the SYSCON circuit board through the connector P411-2 (AUDIO REC) is applied to two systems.

The first one supplies a low voltage to the transistor Q22, makes Q22 ON and supplies high voltage to the pin 8 (VCC) of OSC BLOCK.

The second one supplies a low voltage to the transistor Q24 (For Bias OSC Control), makes Q24 OFF, supplies high voltage to the pin 7 (BIAS CONTROL) of OSC BLOCK and the oscillation frequency is outputted by the pins 1 and 2 of the OSC BLOCK.

The circuit operation is omitted due to the same as the recording or the playback systems.

3.5.4 Audio playback E-E (AUD. PB. E-E)

When the REC button is pressed during Play mode, a low input voltage is applied to the connector P411-4 via SYSCON circuit board, makes the transistor Q18 ON and supplies high output voltage from the collector of Q18. This output voltage is supplied to the pins 7 of IC1 and IC7 via the diodes D3 and D6, selects the electronic switches of IC1 and IC4 to REC mode and makes EE system can be confirmed.

3.5.5 Crosstalk cancellation

The explanation is given that CH-1 is set to Recording mode and CH-2 is set to Playback mode. As the high level signal current is supplied to the CH-1 audio head, the recording signal is induced to the CH-2 audio head coil. The crosstalk cancellation circuit is designed to prevent the crosstalk signal.

The head output signal, which is the sum of head crosstalk component and tapd playback signal, is amplified up to the pertinent level by the preamplifier Q15 and Q16. On the other hand, REC AMP output is mixed with this preamplifier output via phase and level adjustment circuit, which is composed of C115, R141, C114, R140 and variable resistor R139.

In this phase and level adjustment, REC AMP signal is compared with the crosstalk signal. When the opossite phase level is equivalent, the crosstalk component is almost cancelled, and the signal, supplied to pin 2 of IC4 becomes almost only the playback signal on CH-2 tape. This is shown in Fig. 3-80.

The crosstalk phase in the head will change depending on the frequency, and so the crosstalk effect is relatively low in the high frequency region but this is practically no problem.

3.5.6 OSC block

Block diagram of OSC is shown in Fig. 3-81.

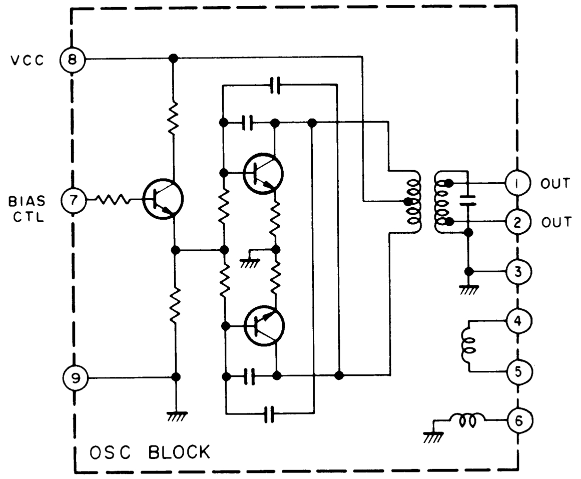

VCC
8
BIAS CTL
7
9
OSC BLOCK
1 OUT
2 OUT
3
4
5
6

Fig. 3-81 Inside of OSC block

When the level of pin 7 becomes high, the oscilating frequency of 66 to 74 kHz is generated through pin 1 and 2.

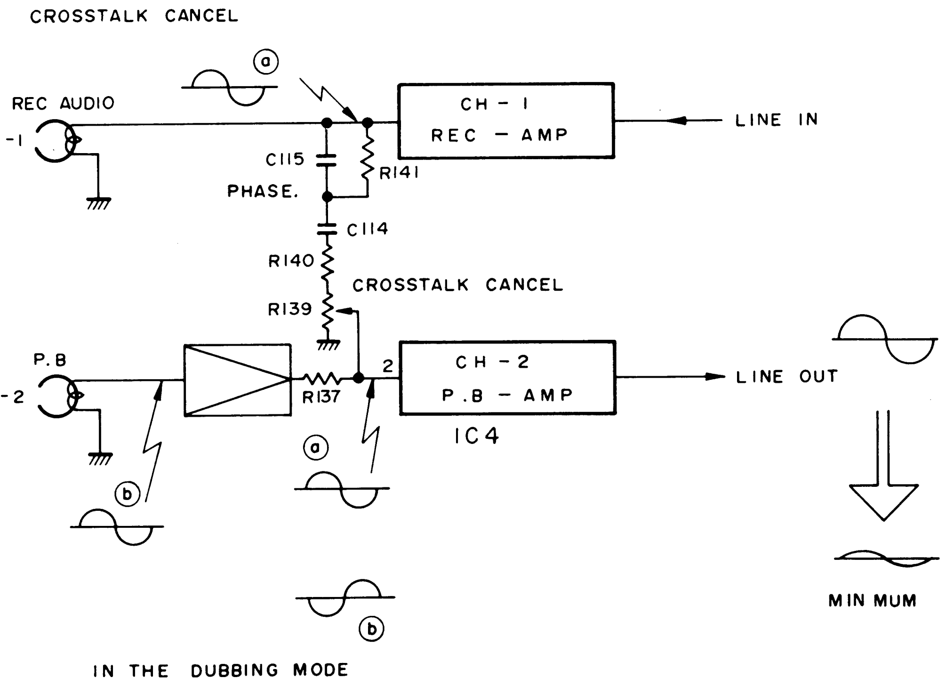

CROSSTALK CANCEL
ⓐ
REC AUDIO
CH-1
C115
PHASE.
R141
CH - 1
REC - AMP
LINE IN
C114
R140
CROSSTALK CANCEL
R139
P.B
CH-2
R137
2
CH - 2
P.B - AMP
IC4
LINE OUT
ⓐ
ⓑ
ⓑ
MIN MUM
IN THE DUBBING MODE

Fig. 3-80 Crosstalk cancellation block

3.5.7 Erase heads selection circuit

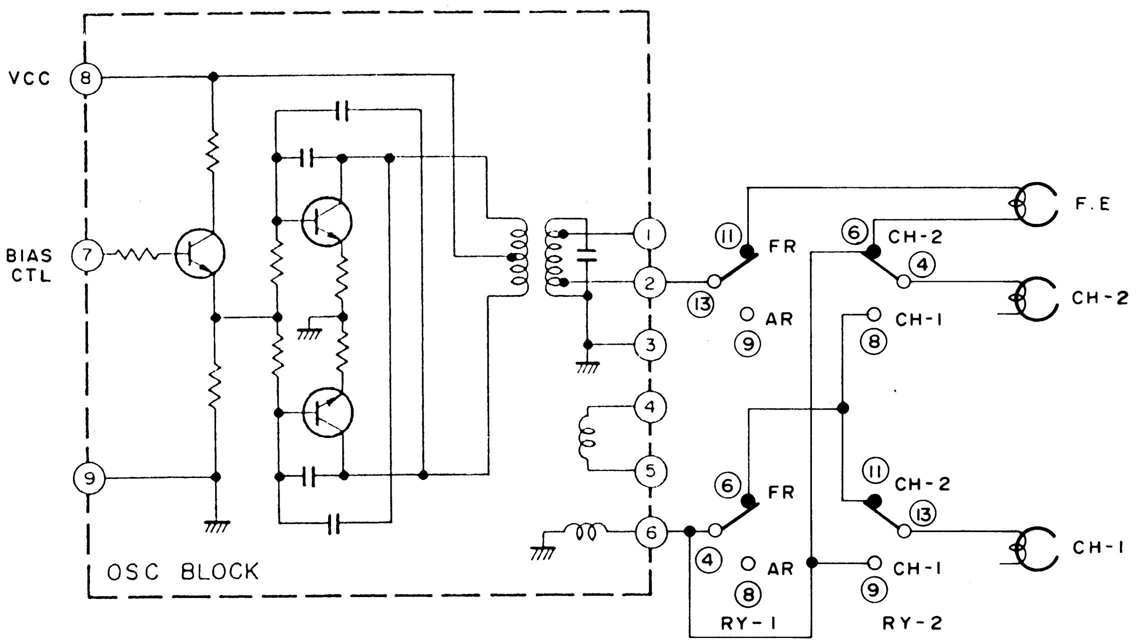

VCC
8
BIAS CTL
7
9
OSC BLOCK
1
2
3
4
5
6
11
FR
13
AR
9
6
FR
4
AR
8
RY-1
6
CH-2
4
CH-1
8
11
CH-2
13
CH-1
9
RY-2
F.E
CH-2
CH-1

Fig. 3-82 REC mode

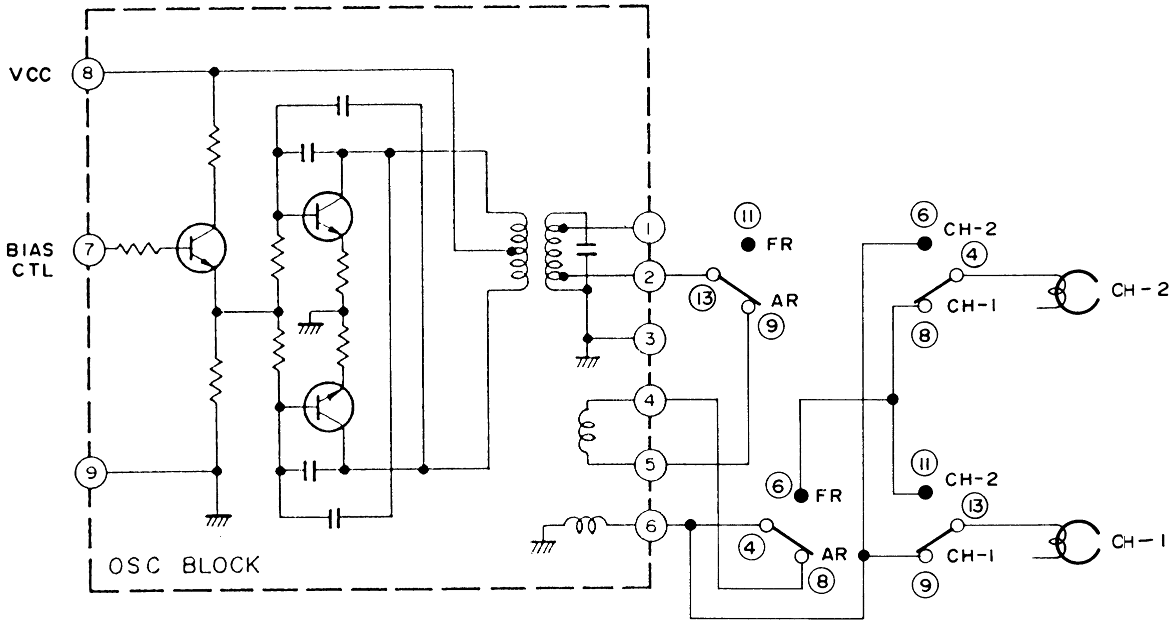

VCC
8
BIAS CTL
7
9
OSC BLOCK
1
2
3
4
5
6
11
FR
13
AR
9
6
FR
4
AR
8
6
CH-2
4
CH-1
8
11
CH-2
13
CH-1
9
CH-2
CH-1

Fig. 3-83 Audio Dubbing mode

There are Full Erase Head (F.E. Head), CH-1 Erase Head (CH-1 E. Head)) and CH-2 Erase Head (CH-2 E. Head) in this system. In normal recording mode, all of these four heads are operating, and either CH-1 or CH-2 Erase Head will operate in the audio dubbing mode.

1. The operation of the circuit is shown in Figures 3-82 and 3-83, respectively for the Recording mode and the Audio Dubbing mode.

3.5.8 Limiter/limiter killer

1. Transistor Q1 operates as a limiter.
2. Transistor Q2 operates as a limiter killer.
3. Audio signal from IC1 pin 9 is charged in the capacitor C5 through C11, R11, being rectified at D1.
4. The differential voltage is generated at C8 and R10, being supplied voltage of 12 V at the capacitor C8. This differential voltage switches on transistor Q3 to discharge the capacitor C5, and to initialize limiter Q1.
5. In audio dubbing mode, the input to connector P412-1 (Audio dubbing - 1) becomes low level to switch on diode D16 and transistor Q19, and to generate high level output at the collector of transistor Q19. This high level output generates the differential voltage through C150 and R14. This differential voltage switch on transistor Q3 to discharge capacitor C5 and to initialize the limiter.
6. In audio EE mode, the input to connector P411-1 (Audio EE) becomes low level to switch on transistor Q23, and to generate the high level output at the collector of the transistor. This high level output makes the differential voltage through C9 and R12. This differential voltage switches on transistor Q3 to discharge C5 and to initialize the limiter.

3.5.9 Pre-amplifier

Transistor Q7 and Q8 are connected as a parallel to double the signal component, and the resulting signal becomes square root of 2 (i.e. $\sqrt{2}$) of the randum noise, generated in the element, due to the fact that some of the noise component is cancelled and other of the component does not. Finally, the noise of 1/f of transistor is reduced. (The noise is reduced down to approximately 3 dB in the lower frequency component.)

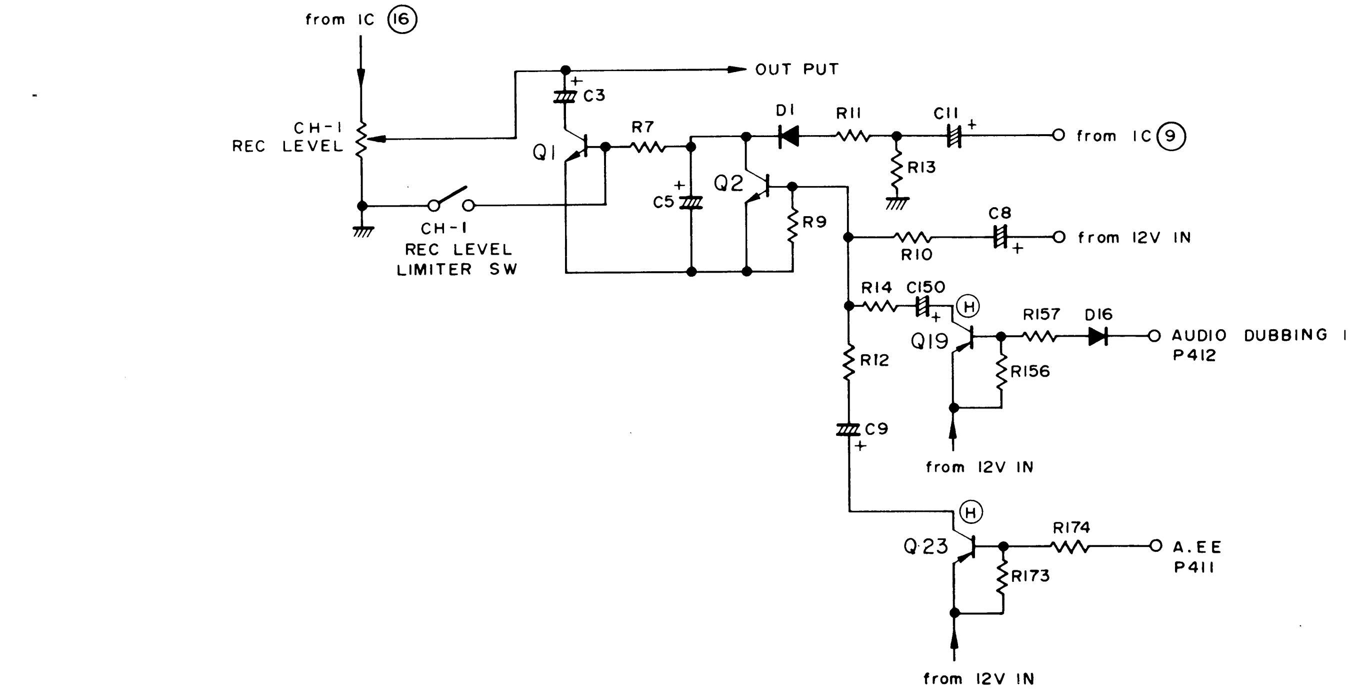

from IC ⑯
OUT PUT
C3
CH-I
REC LEVEL
R7
Q1
D1
R11
C11
from IC ⑨
R13
Q2
C5
R9
C8
from 12V IN
R10
CH-I
REC LEVEL
LIMITER SW
R14
C150
Ⓗ
R157
D16
AUDIO DUBBING I
P412
Q19
R12
R156
C9
from 12V IN
Ⓗ
R174
Q23
A.EE
P411
R173
from 12V IN

Fig. 3-84 Limiter/limiter killer circuit

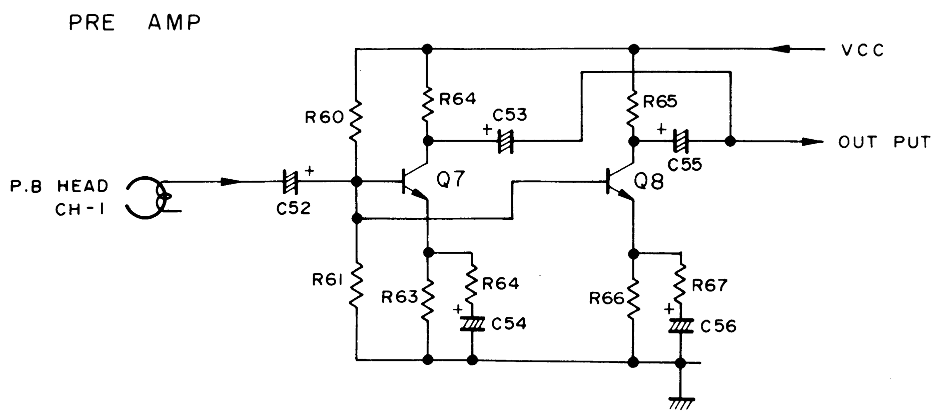


Fig. 3-85 Pre-amp circuit

3.5.10 Mic amplifier muting

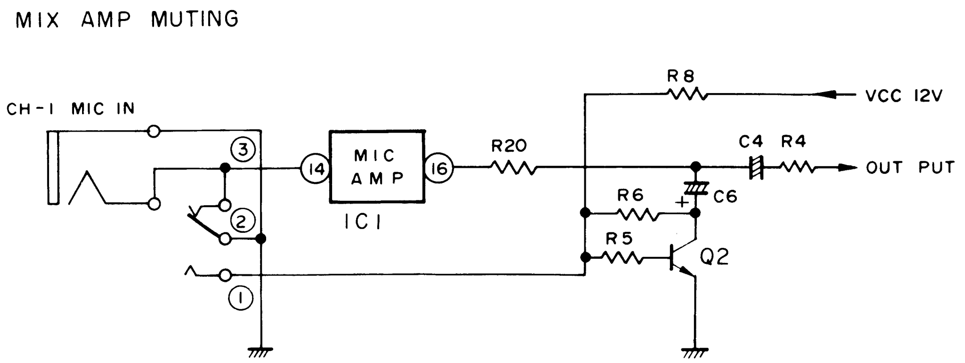


Fig. 3-86 Mic amp circuit

The pin 2 of the micro switch is shorted to pin 3 of that switch, when MIC PLUG is not connected. MIC AMP (IC1) has high gain and so the noise comes out from pin 16 of IC1. This noise component is cut by transistor Q2.

Power supply of 12 V is supplied through R8 and R5 to switch on transistor Q2. The collector of transistor Q2 is electrically grounded to cut the noise component.

When MIC PLUG is connected, pin 2 of micro switch is shorted to pin 1 of the switch to cut off transistor Q2.

3.5.11 Dolby circuit

This unit is using Dolby B type noise reduction system. In this system, the compression and expander in which the input signal is recorded after being compressed at a certain level, and then it is expanded to regenerate the playback output.

For such high level input as exceeding 0 dB, the circuit works as the linear amplifier circuit by using the main pass circuit which does not have noise reduction function in ordr to reduce the overshoot distorsion in the attack signal.

For lower level input, the noise reduction function is conducted in the side chain circuit.

In this side chain circuit, the sliding band method is adopted. In this method, the high frequency band correction is large even for the high level input signal if it does not include the high frequency band, and the cut off frequency becomes higher even for lower level signal if it includes the many high frequency band components. These function is conducted by the variable resistor peak detection circuit in order to adjust the noise reduction effect and to ingeniously avoid the reflection of the lower frequency component. Also in this circuit, the circuit attack time becomes quick when the input signal change abruptly and largely, and that time becomes slow when the input level charge is slow and small.

The signal, processed in this side chain circuit, and the signal from the main pass circuit are applied to the adder to obtain encoder output.

3.5.12 Muting control

IC7 (HA12006) in this circuit is used as a muting IC.

When the power is on, and when low level input is applied to pin 15 of IC7, muting for LINE OUT, MONITOR OUT and HEADPHONE OUT is performed in the MUTING LOGIC circuit, which is in IC7.

The muting time constant is determined by the capacitor C125, and the muting time becomes longer in proportion to the time constant.

When AUDIO EE (A.EE), AUDIO PLAYBACK EE (A PBEE) and AUDIO DUBBING (AD) trnansfers, transistor Q25 generates the signal which makes the signal of pin 15 on IC7 low.

For example, when AUDIO EE mode is selected, the low level input signal from the system control board is applied to the connector P411-1 pin, and this signal switches on transistor Q23 to output the high level output from the collector of Q18.

This high level output, being differentiated by C120 and R151, switches on transistor Q25, and the low level input is applied to pin 15 of IC7 through diode D20, resulting in MUTING.

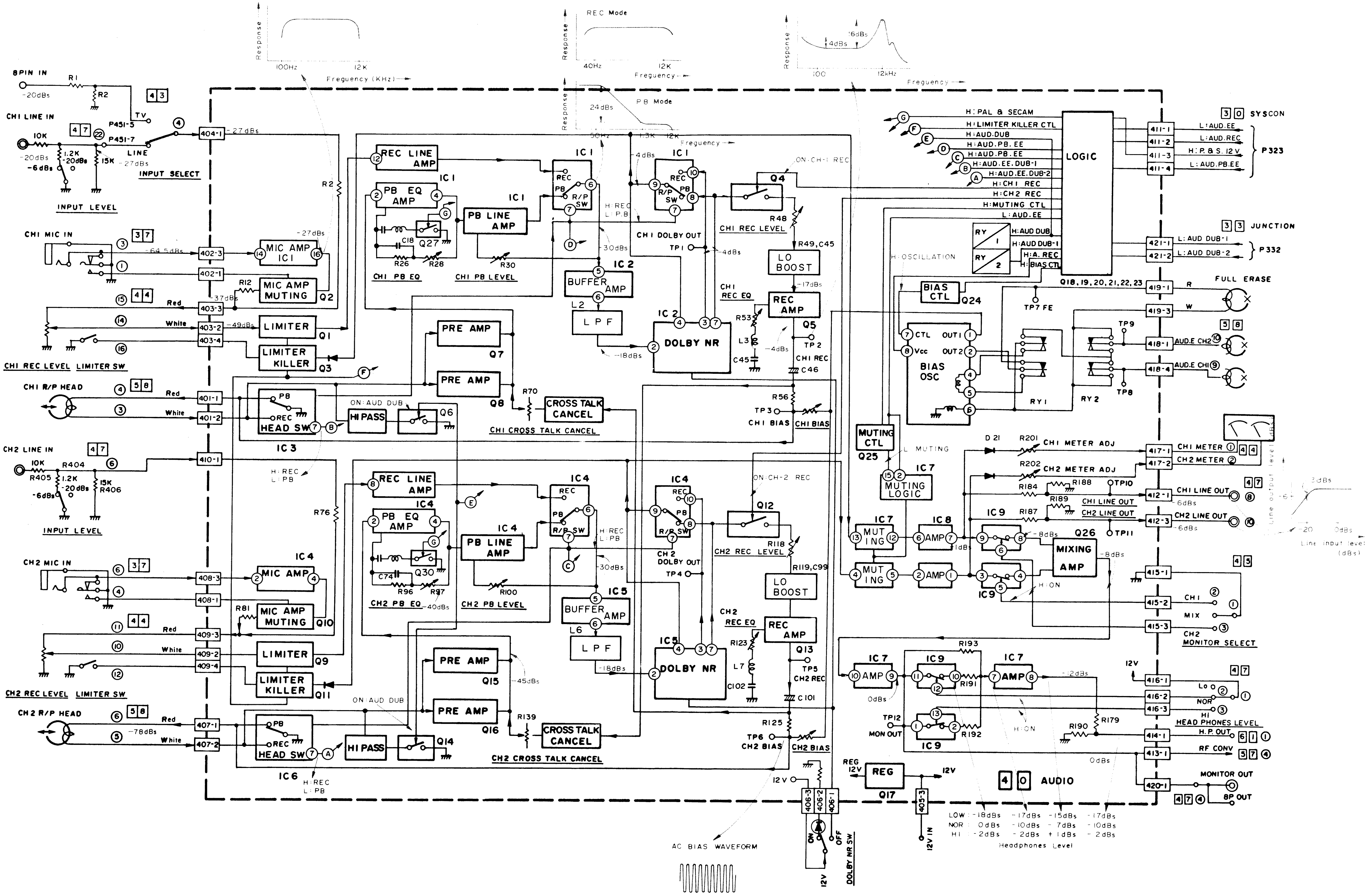

8PIN IN
-20dBs
R1
R2
TV
P451-5
P451-7
4 3
CH1 LINE IN
10K
4 7
22
LINE
-27dBs
-20dBs
-6dBs
1.2K
15K
INPUT SELECT
INPUT LEVEL
CH1 MIC IN
3 7
-64.5dBs
MIC AMP IC1
MIC AMP MUTING
Q2
R12
-37dBs
-27dBs
R2
CH1 REC LEVEL
LIMITER SW
4 4
Red
White
-49dBs
LIMITER
Q1
LIMITER KILLER
Q3
CH1 R/P HEAD
5 8
PB
REC
HEAD SW
IC 3
ON:AUD DUB
HI PASS
Q6
PRE AMP
Q7
Q8
R70
CROSS TALK CANCEL
CH1 CROSS TALK CANCEL
REC LINE AMP
IC1
PB EQ AMP
C18
Q27
R26
R28
CH1 PB EQ
PB LINE AMP
R30
CH1 PB LEVEL
REC
PB
R/P SW
H:REC
L:PB
-30dBs
BUFFER AMP
IC 2
L2
L P F
-18dBs
DOLBY NR
CH1 DOLBY OUT
TP1
-4dBs
ON:CH-1 REC
Q4
R48
CH1 REC LEVEL
R49,C45
LO BOOST
-17dBs
CH1 REC EQ
REC AMP
Q5
R53
L3
C45
TP 2
CH1 REC
C46
R56
TP3
CH1 BIAS
REC Mode
PB Mode
Response
Frequency
Frequency (KHz)
100Hz
12K
40Hz
24dBs
50Hz
1.3K
16dBs
4dBs
100
12kHz
H:PAL & SECAM
H:LIMITER KILLER CTL
H:AUD.DUB
H:AUD.PB.EE
H:AUD.EE.DUB-1
H:AUD.EE.DUB-2
H:CH1 REC
H:CH2 REC
H:MUTING CTL
L:AUD.EE
LOGIC
RY 1
RY 2
H:AUD DUB
H:AUD DUB-1
H:A.REC
H:BIAS CTL
H:OSCILLATION
Q18,19,20,21,22,23
411-1
411-2
411-3
411-4
L:AUD.EE
L:AUD.REC
H:P.& S. 12V
L:AUD.PB.EE
3 0 SYSCON
P323
3 3 JUNCTION
421-1
421-2
L:AUD DUB-1
L:AUD DUB-2
P332
FULL ERASE
419-1
419-3
R
W
BIAS CTL
Q24
TP7 FE
CTL
OUT1
Vcc
OUT2
BIAS OSC
TP9
TP8
RY1
RY 2
5 8
418-1
418-4
AUD.E CH2
AUD.E CH1
MUTING CTL
Q25
L:MUTING
IC7
MUTING LOGIC
D21
R201
CH1 METER ADJ
R202
CH2 METER ADJ
417-1
417-2
CH1 METER
CH2 METER
4 4
R184
R188
TP10
R189
R187
CH1 LINE OUT
CH2 LINE OUT
TP11
412-1
412-3
-6dBs
4 7
IC 7
IC 8
MUT ING
AMP
IC 9
Q26
-8dBs
MIXING AMP
H:ON
Line output level
Line input level (dBs)
-3dBs
+6
-20
0dBs
4 5
415-1
415-2
415-3
CH1
MIX
CH2
MONITOR SELECT
R193
-12dBs
R191
R192
R190
R179
0dBs
TP12
MON OUT
12V
416-1
416-2
416-3
Lo
NOR
HI
HEAD PHONES LEVEL
414-1
H.P. OUT
6 1
413-1
RF CONV
5 7
REG 12V
REG
Q17
4 0 AUDIO
420-1
MONITOR OUT
8P OUT
4 7
CH2 LINE IN
R404
R405
R406
CH2 MIC IN
MIC AMP
Q10
R81
Q9
Q11
CH2 REC LEVEL
CH2 R/P HEAD
-78dBs
IC6
H:REC
L:PB
Q14
PRE AMP
Q15
-45dBs
Q16
R139
CH2 CROSS TALK CANCEL
R76
IC4
Q30
C74
R96
R97
CH2 PB EQ
-40dBs
R100
CH2 PB LEVEL
IC 5
L6
ON:CH-2 REC
Q12
R118
CH2 REC LEVEL
CH 2 DOLBY OUT
TP4
R119,C99
CH2 REC EQ
Q13
R123
L7
C102
TP5
CH2 REC
C101
R125
TP6
CH2 BIAS
406-3
406-1
405-3
ON
OFF
DOLBY NR SW
12V IN
AC BIAS WAVEFORM
65~75KHz 40V~50Vp-p
LOW : -18dBs -17dBs -15dBs -17dBs
NOR : 0dBs -10dBs -7dBs -10dBs
HI : -2dBs -2dBs +1dBs -2dBs
Headphones Level

Fig. 3-87

3-76

SECTION 4
MECHANICAL ADJUSTMENT

4.1 GENERAL

The adjustments described in this section are those which can be performed by a qualified service technician. Those which require highly specialized equipment and training are omitted.

Proper maintenance and inspection are important both for ensuring top performance and preventing damage to the tape. Note that the required jigs must be employed when specified in the adjustment steps.

IMPORTANT:

1. *Always turn the power off before removing or soldering components.*
2. *When removing a screw from the chassis, be careful not to drop it into the mechanism. If a screw should be dropped, be sure to retrieve it.*
3. *Be extremely careful not to damage either the upper or lower head drum assemblies.*
4. *The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require readjustment.*
5. *When removing a part, be very careful not to damage or displace other parts. (Be especially careful with the guide poles and rotary video head drum.)*
6. *To check the mechanism without the cassette tape, disable the photo transistor sensors by covering them with opaque material. After completing checks and repairs, be sure to remove the covers.*
7. *Place a suitable weight on the cassette when operating without the housing.*
8. *To open the protective door of the cassette, press the small locking tab at the upper right corner of the cassette and open the hinged door manually. Since the tape becomes exposed, use care not to damage or soil it.*

4.2 REQUIRED JIGS AND TOOLS

For proper mechanical adjustment, the following jigs and tools are strongly recommended. Without them, a long trial-and-error period would be necessary.
In addition, general-purpose tools and a set of metric hex keys (not supplied by JVC) are required.
The hex keys needed for this model are 1.5 and 2.4 mm size.

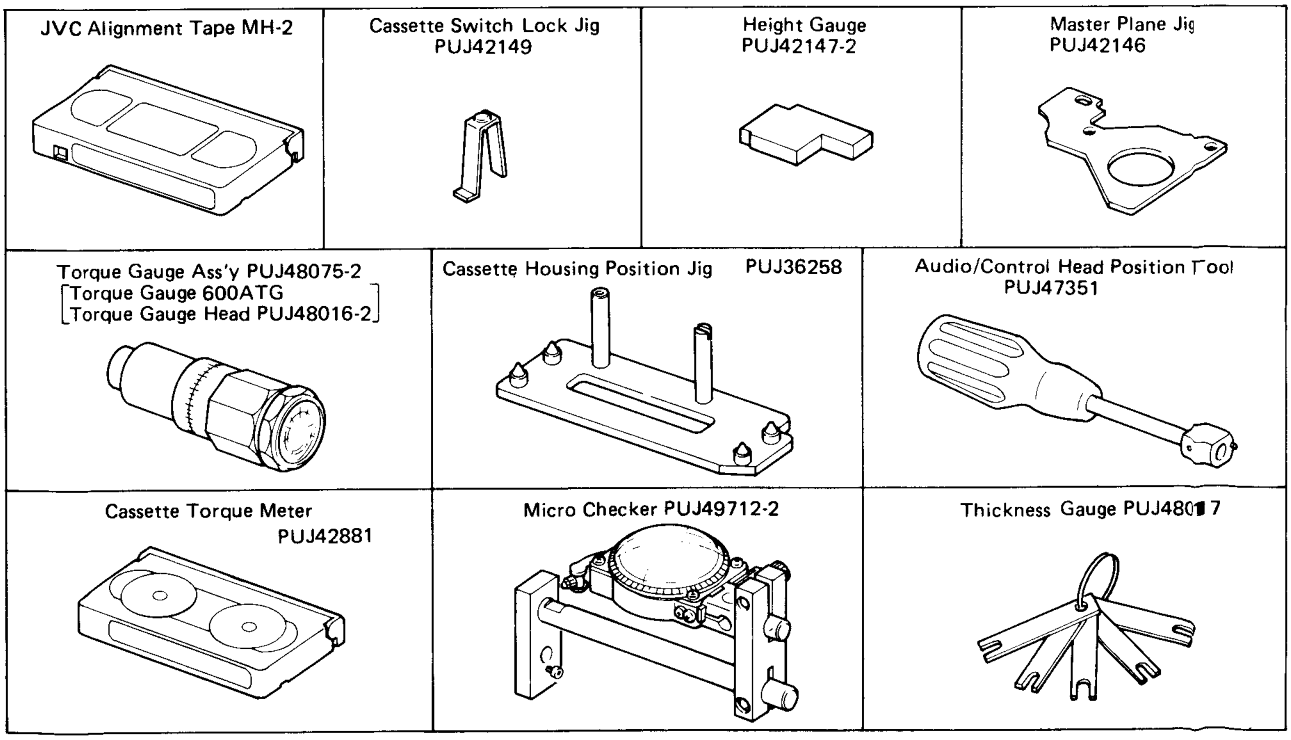

JVC Alignment Tape MH-2
Cassette Switch Lock Jig PUJ42149
Height Gauge PUJ42147-2
Master Plane Jig PUJ42146
Torque Gauge Ass'y PUJ48075-2
[Torque Gauge 600ATG
Torque Gauge Head PUJ48016-2]
Cassette Housing Position Jig PUJ36258
Audio/Control Head Position Tool PUJ47351
Cassette Torque Meter PUJ42881
Micro Checker PUJ49712-2
Thickness Gauge PUJ48017

Fig. 4-1 Jigs and tools

4.3 LAYOUT OF MAIN MECHANICAL PARTS

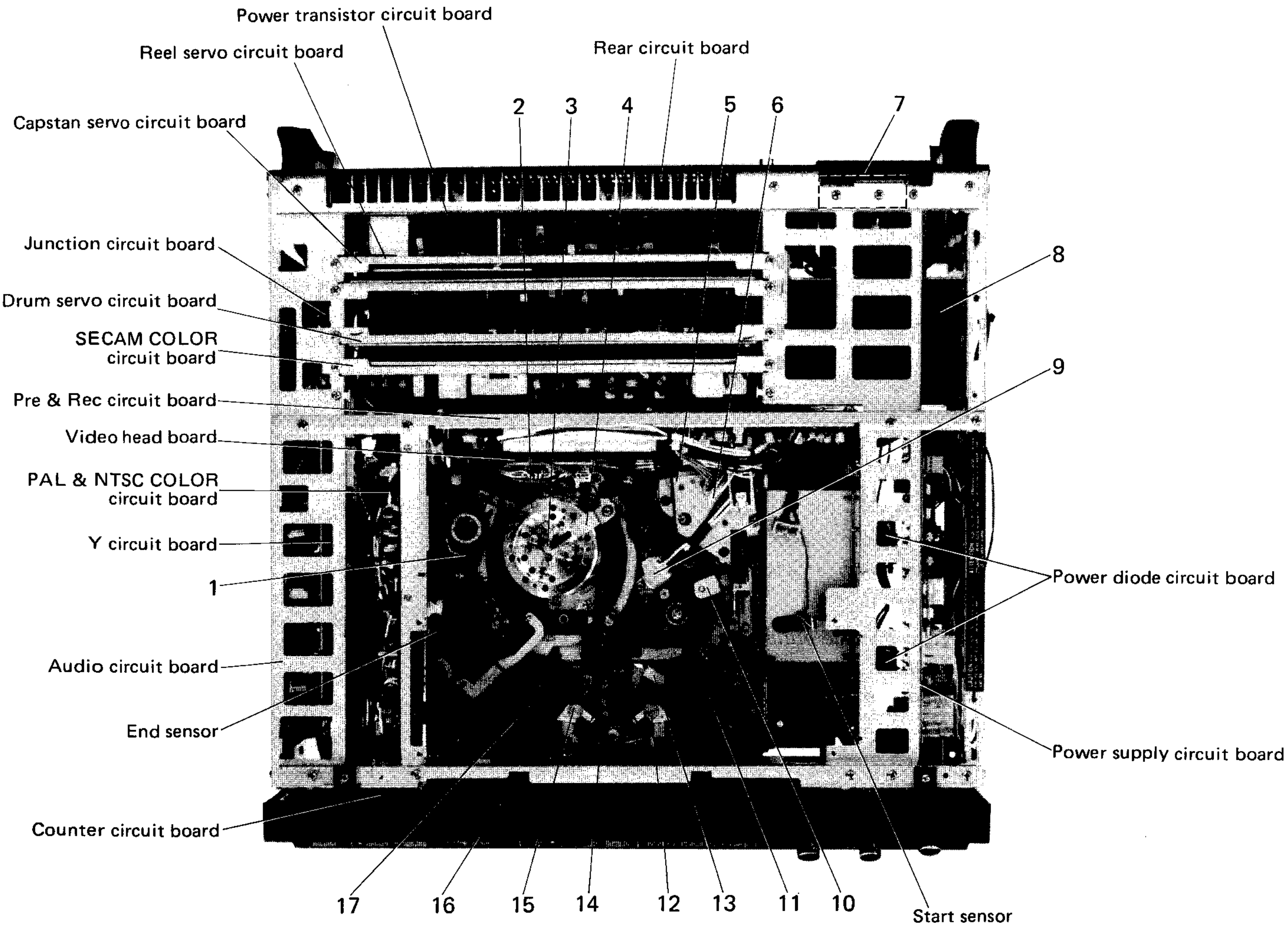

Power transistor circuit board
Reel servo circuit board
Rear circuit board
Capstan servo circuit board
2
3
4
5
6
7
Junction circuit board
8
Drum servo circuit board
SECAM COLOR circuit board
9
Pre & Rec circuit board
Video head board
PAL & NTSC COLOR circuit board
Y circuit board
1
Power diode circuit board
Audio circuit board
End sensor
Power supply circuit board
Counter circuit board
17
16
15
14
12
13
11
10
Start sensor

Fig. 4-2 Top view

Symbol No.	Part No.	Part Name	Description
1	PU47863	Full erase head	BR-6400TR only
2	PU20850H	Upper drum ass'y	
3	PU49483	Commutator	
4	PU48678A	Brush ass'y	
5	PU50542-2	Tape guide (Reverse) solenoid	
6	PU50543	Pinch roller solenoid	
7	–	RF convertor	(OPTION)
8	PU54163	Power transformer	
9	PU50584-1A	Audio/Control head ass'y	BR-6400TR only
	PU50584-2A	"	BP-5300TR only
10	PU50554A	Pinch roller holder ass'y	
11	PU50532A	Take-up reel disk ass'y	
12	PU50535B	Take-up brake ass'y	
13	PU50547A	B.T. lever ass'y	
14	PU50594	Cassette lamp	
15	PU50535A	Supply brake ass'y	
16	PU50382A	Record safety switch ass'y	BR-6400TR only
17	PU50532B	Supply reel disk ass'y	

Table 4-1

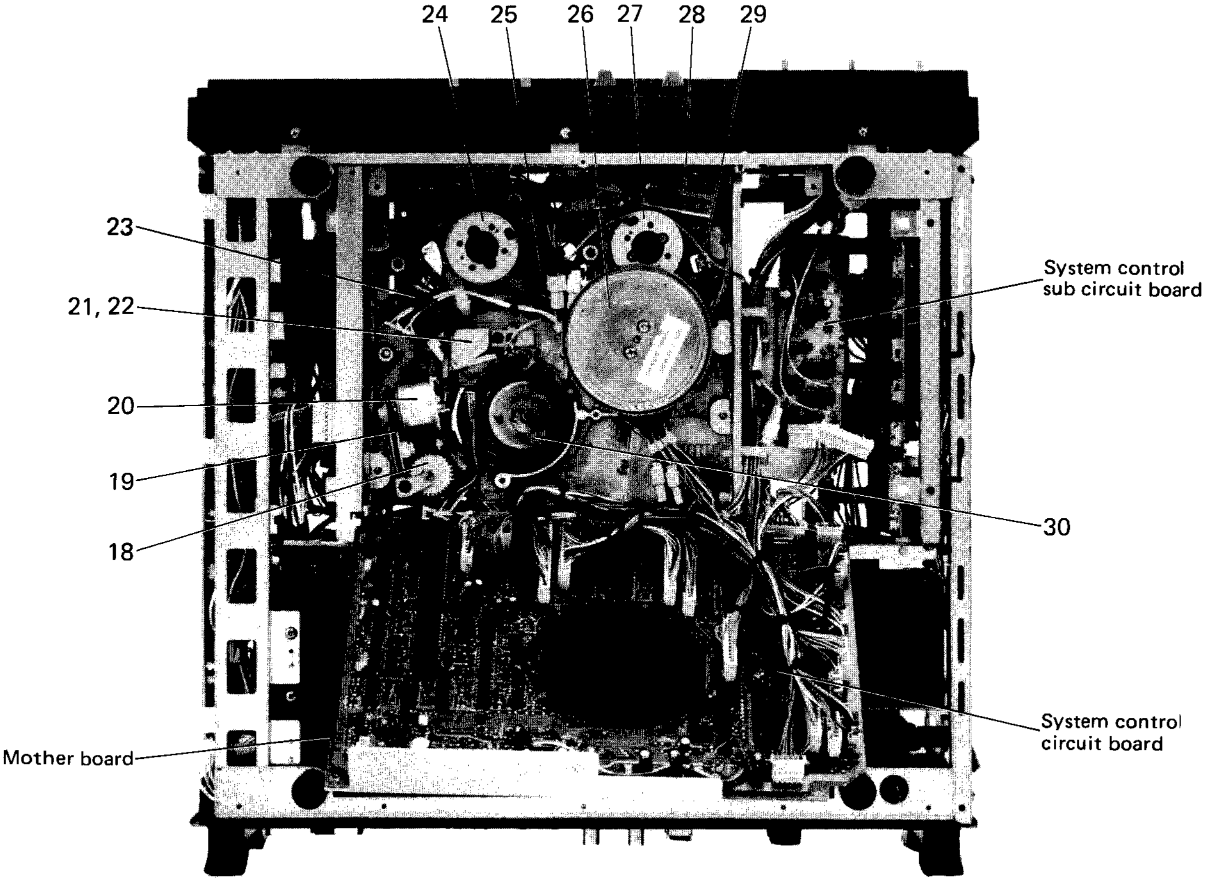

24
25
26
27
28
29
23
21, 22
20
19
18
Mother board
System control sub circuit board
30
System control circuit board

Fig. 4-3 Bottom view

Symbol No.	Part No.	Part Name	Description
18	PU50571A	Loading drive gear ass'y	Incl. (19) and (20)
19	PU50350	Loading belt	
20	PU52745A	Loading motor ass'y	
21	QSM1S11-201	A.L. switch	(inner)
22	QMS1S11-201	U.L. switch	(outer)
23	PU50549A	Differential transformer ass'y	
24	PU50531-2	Supply reel motor	
25	PU50544	L.T. solenoid	
26	PU50530	Capstan motor	
27	PU50531	Take-up reel motor	
28	PU50542	Brake solenoid	
29	PU48959A	Cassette switch ass'y	
30	PUS26687A	Lower drum ass'y	

Table 4-2

4.4 DISASSEMBLY

4.4.1 Chassis removal

1. Remove the two screws ① from the rear of the top cover.

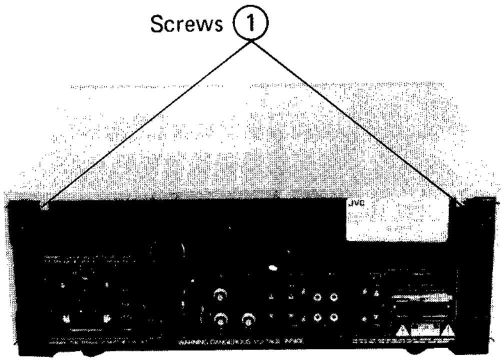

Screws ①
JVC

Fig. 4-4

2. Take out four screws② and remove the side cover.

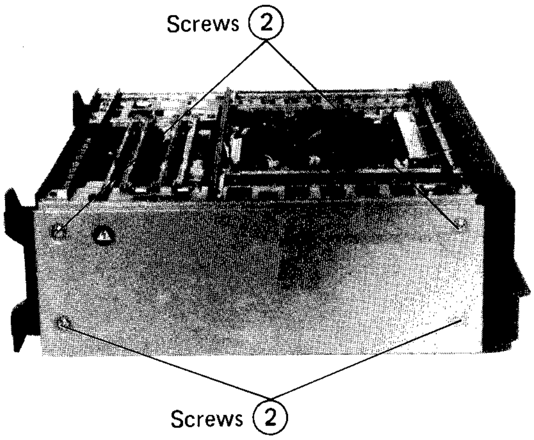

Screws ②
Screws ②

Fig. 4-5

3. Remove the bottom cover after removing six screws③.

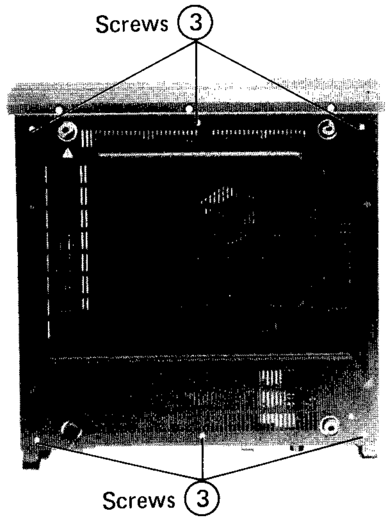

Screws ③
Screws ③

Fig. 4-6

4.4.2 Rear cover removal

- Take off four screws④ and remove the rear panel.

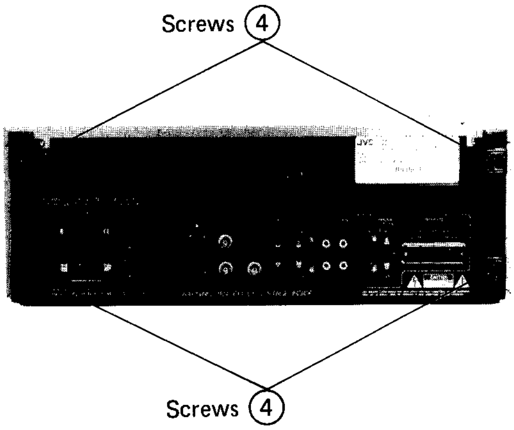

Screws ④
JVC
Screws ④

Fig. 4-7

4.4.3 Front panel removal

- Remove five screws⑤ from the front panel.

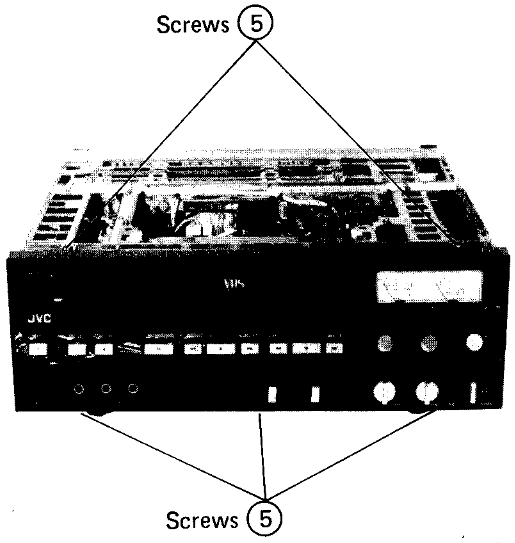

Screws ⑤
VHS
JVC
Screws ⑤

Fig. 4-8

4.4.4 Color board

1. If necessary to remove the color board, takeout 2 screws (number 68 in chassis assembly exploded view of section 7.5).
2. When reinstalling the board, be sure it is properly engaged with the two PWB holders (number 97 in main beck-1 assembly exploded view of section 7.8).

4.5 PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette recorder.

4.5.1 Cleaning

1. For cleaning parts except the video heads, use gauze or lint-free cloth dampened with alcohol.
2. When cleaning the portions of the upper and lower drums which contact the video tape, use a lint-free cloth moistened with alcohol. Avoid touching the video heads while performing this.
3. When cleaning the video heads on the upper drum, use one hand to hold the upper drum still. With a lint-free cloth moistened in alcohol, very gently wipe the video heads with a side to side motion.

IMPORTANT:
Do not wipe the video heads with an up and down motion, as this may dislodge the video heads.

4. When cleaning rubber and plastic parts, avoid using excessive alcohol since it may accelerate deterioration of these parts.
5. After cleaning with alcohol, allow the parts to dry thoroughly before using a cassette tape.

4.5.2 Periodically replaced parts

The replacement periods of the parts shown in Table 4-3 are typical for equipment that is used in accordance with the instruction manual. Note that the times may vary considerably according to environmental and usage conditions. As a rule, inspect these components whenever performing major service on the machine and replace those which show obvious signs of wear or deterioration.

PART NAME	OPERATING HOURS									
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
Tension pole Supply slant pole Supply guide roller Supply guide pin Supply guide pole Supply impedance roller Take-up impedance roller Tape guide Capstan Take-up guide roller Take-up slant pole Supply brake Take-up brake	C	C	C	C	C	C	C	C	C	C
Full erase head	C	C	C	C	C	C	C	C	C	R
Audio/control head ass'y	C	C	C	R	C	C	C	R	C	C
Upper drum ass'y	C	R	C	R	C	R	C	R	C	R
Pinch roller	C	C	C	R	C	C	C	R	C	C
Supply reel motor				R				R		
Take-up reel motor				R				R		
Capstan motor ass'y						R				
Cassette housing motor										R
Loading motor										R
Loading motor pulley		C		C		C		C		C
Loading gear pulley		C		C		C		C		C
Supply reel disk rubber tire		C		R		C		R		C
Take-up reel disk rubber tire		C		R		C		R		C
Loading belt		C		R		C		R		C
Brush ass'y	C	C	C	R	C	C	C	R	C	C
Commutator	C	C	C	R	C	C	C	R	C	C

NOTE: Upper drum life is influenced by the operating conditions.

Key to abbreviations:
C : Cleaning
R : Replacement

Table 4-3 Periodic maintenance

4.6 MAIN ASSEMBLY REPLACEMENTS

4.6.1 Cassette housing assembly

1. Cover the tape end sensor with opaque material.
2. Supply power and turn the rubber rollers of the cassette housing assembly by hand in the loading direction to start the housing motor.
3. Press in the raised portion of the cassette housing slide plate to lower the cassette housing. When the Stop mode is reached, turn off the power and disengage the connector.
4. Take out four screws and carefully remove the cassette housing assembly as shown in Fig. 4-9.

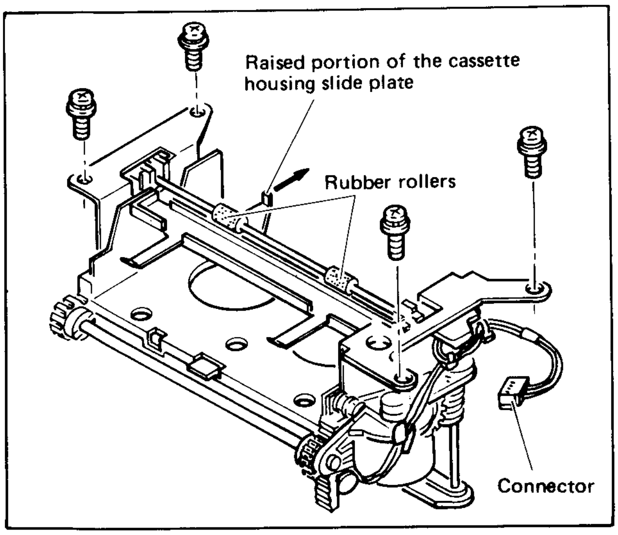

Raised portion of the cassette housing slide plate
Rubber rollers
Connector

Fig. 4-9

5. Tentatively place new housing into machine.
6. Set the cassette housing position jig (PUJ36258) with the two long prongs covering the corresponding studs of the main deck.
7. Adjust the position of the housing so that its holes match the four short prongs of the jig.
8. Insert and secure the four screws, then remove the jig.

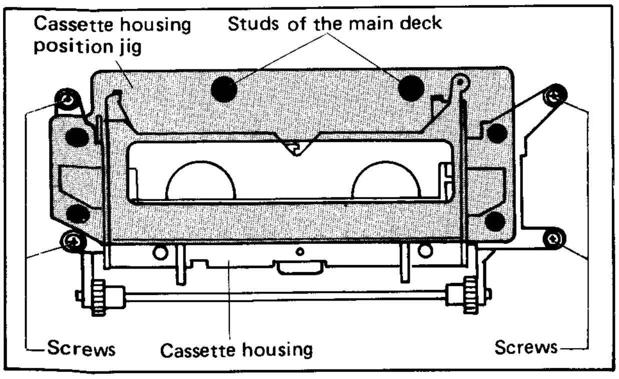

Cassette housing position jig
Studs of the main deck
Screws
Cassette housing
Screws

Fig. 4-10

9. Engage the connector.
10. Remove the coverings from the tape end sensor.
11. Use a cassette tape and check for smooth operation of the cassette housing ass'y.

4.6.2 Upper drum and brush assemblies/commutator

- Both video heads must be replaced simultaneously together with the upper drum assembly.

1. Take out screw Ⓐ and remove the brush assembly. See Fig. 4-11.
2. Remove the commutator from the drum motor shaft.
3. Unsolder the 8 wires coming from the lower drum assembly (perform quickly to avoid damaging the wires).
4. Take out screws Ⓑ and remove the upper drum assembly in the upward direction.
5. Use alcohol to clean the lower face of the new upper drum assembly and the flywheel face of the lower drum assembly. When handling and installing the new upper drum, avoid directly touching the video heads and use care not to scratch the drum.

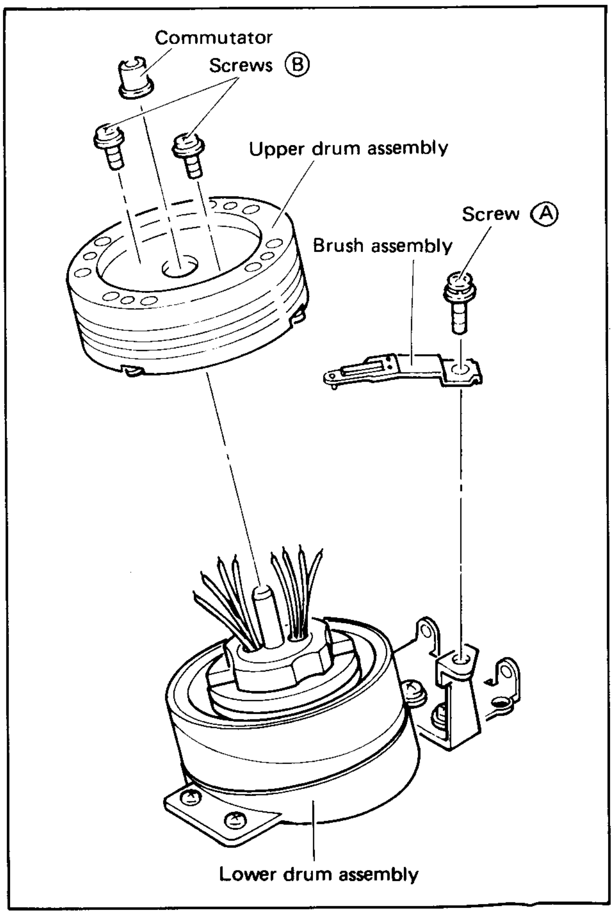

Commutator
Screws Ⓑ
Upper drum assembly
Screw Ⓐ
Brush assembly
Lower drum assembly

Fig. 4-11

6. Reassemble by reversing the above steps. Observe the correct positions when resoldering the wires as shown in Fig. 4-12. Avoid overheating the wires when resoldering. Observe that the brush assembly contacts the central portion of the commutator.

7. Perform the following checks and adjustments.
   (1) Upper drum eccentricity adjustment (section 4.7.11).
   (2) Tape transport (section 4.8).
   (3) Switching point (section 5.5.8 to 5.5.10).
   (4) Sub-tracking (section 5.6.7).
   (5) Video head resonance and Q (section 5.8.7).
   (6) P.B. color channel balance and level (section 5.8.8).
   (7) Frequency channel balance (section 5.8.29).
   (8) Rec. FM level (section 5.8.6).
   (9) Rec. color channel balance and level (section 5.8.27).

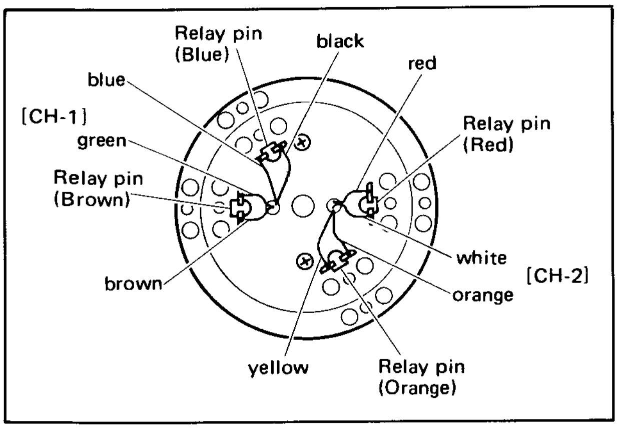


Fig. 4-12 Upper drum top view

4.6.3 Lower drum assembly (Drum motor)

- The drum motor cannot be replaced as a single motor component. Replace the lower drum ass'y when the drum motor requires replacement.

1. Disengage the connector from the lower drum assembly (from the bottom side).
2. Remove the brush assembly and the upper drum assembly.
3. Take out the two screws Ⓐ , one screw Ⓑ and one screw Ⓒ, then remove the HEAD board with the board bracket.
4. Unsolder the eight wires from the HEAD board.
5. Take out the two screws Ⓓ and remove the lower drum ass'y.
6. Take out the two screws Ⓔ and remove the heater from the lower drum ass'y.

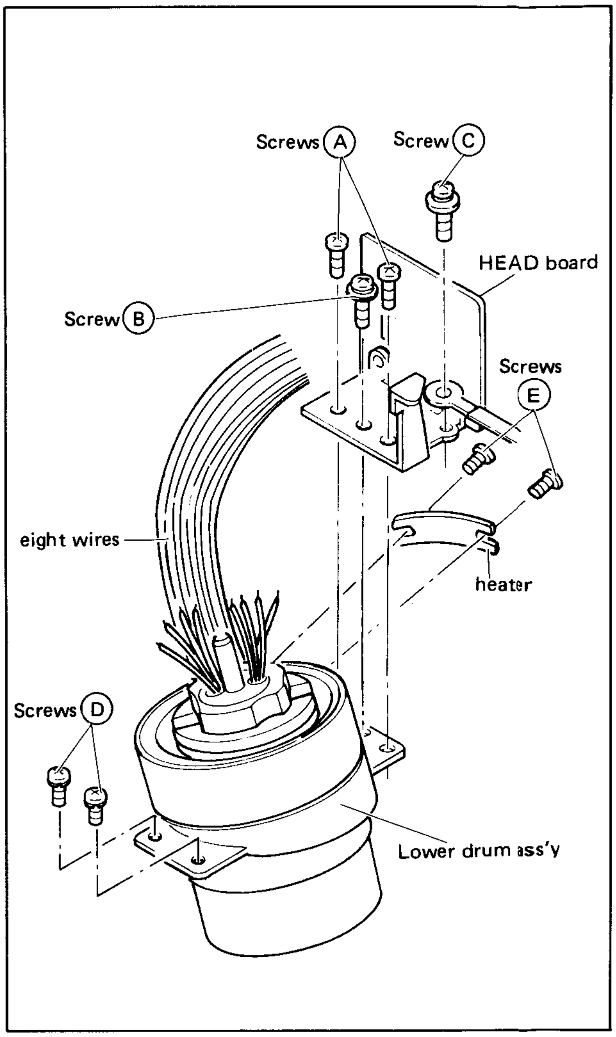


Fig. 4-13 Lower drum replacement

7. Place new lower drum ass'y and reassemble by reversing the above steps. Use care to solder the wires to HEAD board in their proper positions as shown in Fig. 4-14.

8. Perform the following checks and adjustment.
   (1) PG head positioning (section 4.7.10).
   (2) Upper drum eccentricity adjustment (section 4.7.11).
   (3) Tape transport (section 4.8).
   (4) Switching point (section 5.5.8 to 5.5.10).
   (5) Sub-tracking (section 5.6.7).
   (6) Video head resonance and Q (section 5.8.7).
   (7) P.B. color channel balance and level (section 5.8.8).
   (8) P.B. frequency channel balance (section 5.8.29).
   (9) REC FM level (section 5.8.6).
   (10) Rec. color channel balance and level (section 5.8.27).

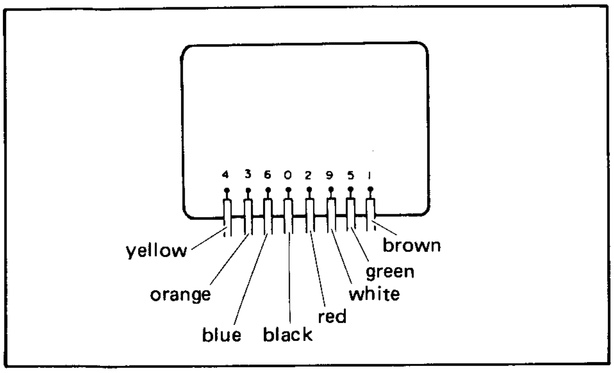

4 3 6 0 2 9 5 1
yellow
orange
blue
black
red
white
green
brown

Fig. 4-14

4.6.4 Capstan motor assembly

The capstan motor cannot be replaced as a single motor component. Replace the capstan motor ass'y which includes the capstan, capstan FG and flywheel when the capstan motor requires replacement.

1. Disengage the two connectors from the bottom side.
2. Take out the three screws and remove the capstan motor ass'y.
3. Install new capstan motor ass'y by reversing the above steps.

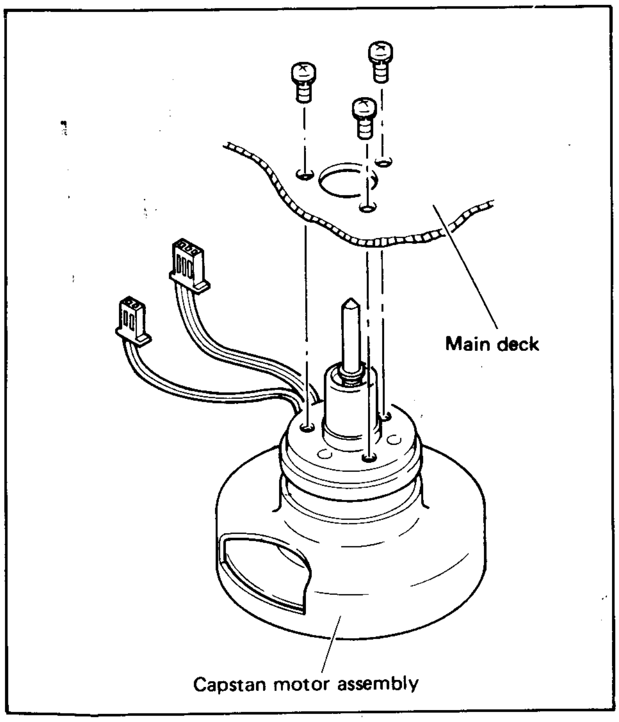

Main deck
Capstan motor assembly

Fig. 4-15

4.6.5 Supply reel motor

1. Remove the cassette housing ass'y.
2. Take out the screw and E-ring, then remove the supply reel FG board and supply brake temporarily.
3. Loosen the setscrew and remove the supply reel disk ass'y.
4. Disengage the connector.
5. Take out the four motor screws and remove the supply reel motor.
6. Install new supply reel motor and reassemble by reversing the above steps.
7. Perform the reel disk height adjustment (section 4.7.2).

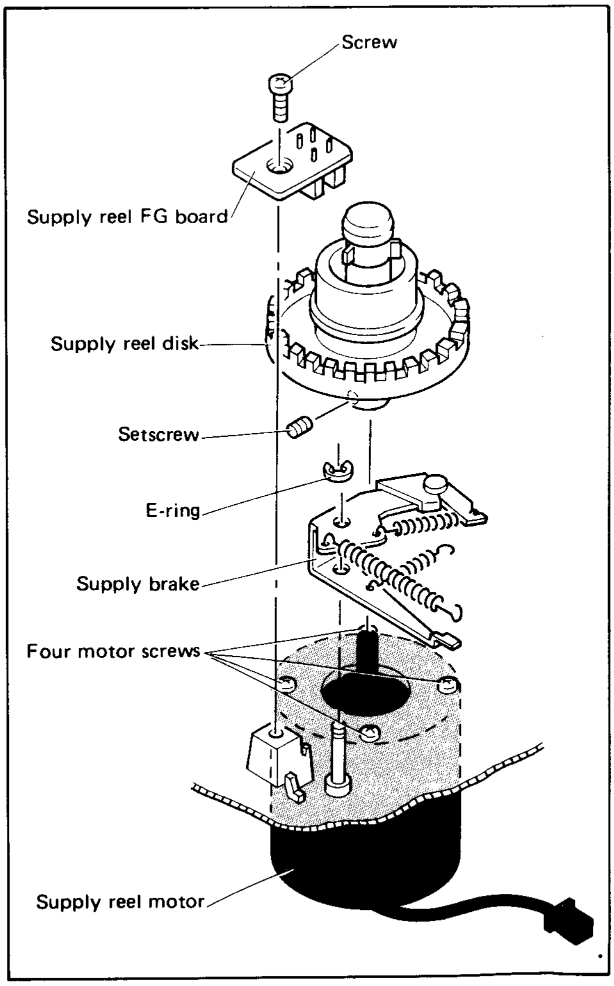

Screw
Supply reel FG board
Supply reel disk
Setscrew
E-ring
Supply brake
Four motor screws
Supply reel motor

Fig. 4-16

4.6.6 Take-up reel motor

1. Remove the cassette housing ass'y.
2. Take out the screw and two E-rings, then remove the take-up reel FG board, loading tension lever and take-up brake temporarily.
3. Loosen the setscrew and remove the take-up reel disk ass'y.
4. Take out two screws and temporarily remove the brake solenoid.
5. Disengage the connector.
6. Take out the four screws and remove the take-up reel motor.
7. Install new take-up reel motor and reassemble by reversing the above steps.
8. Perform the reel disk height adjustment (section 4.7.2).

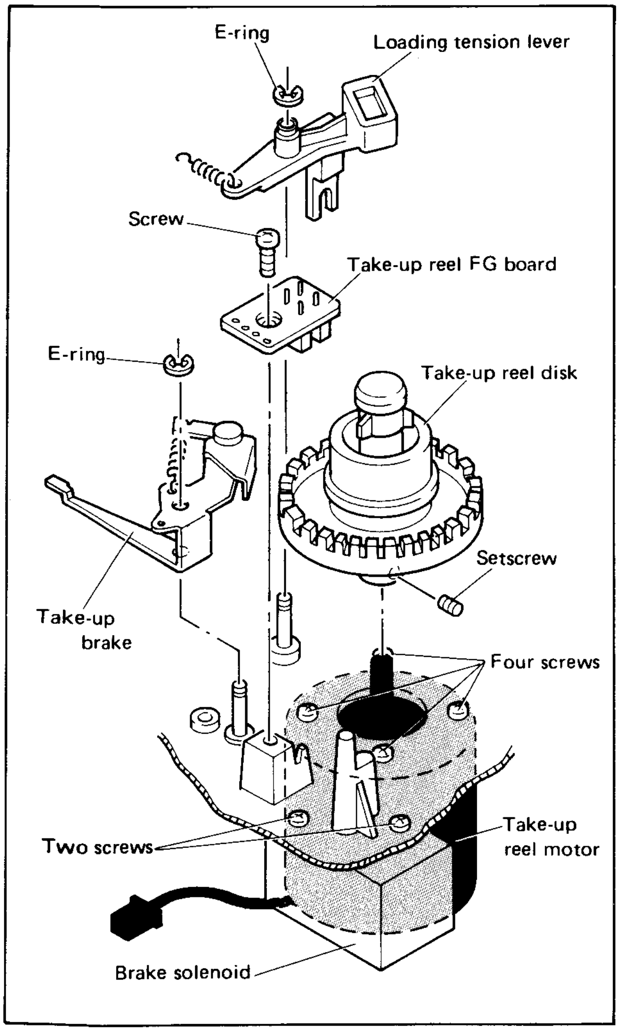

E-ring
Loading tension lever
Screw
Take-up reel FG board
E-ring
Take-up reel disk
Setscrew
Take-up brake
Four screws
Two screws
Take-up reel motor
Brake solenoid

Fig. 4-17

4.6.7 Cassette housing motor

1. Remove the cassette housing ass'y referring to section 4.6.1.
2. Unsolder the housing motor wires.
3. Disengage the belt from the motor pulley, take out two screws and remove the housing motor.
4. Install new housing motor and reassemble by reversing the above steps. Note polarity when resoldering the motor wires.
5. Use a cassette tape and check for smooth operation of the cassette housing ass'y.

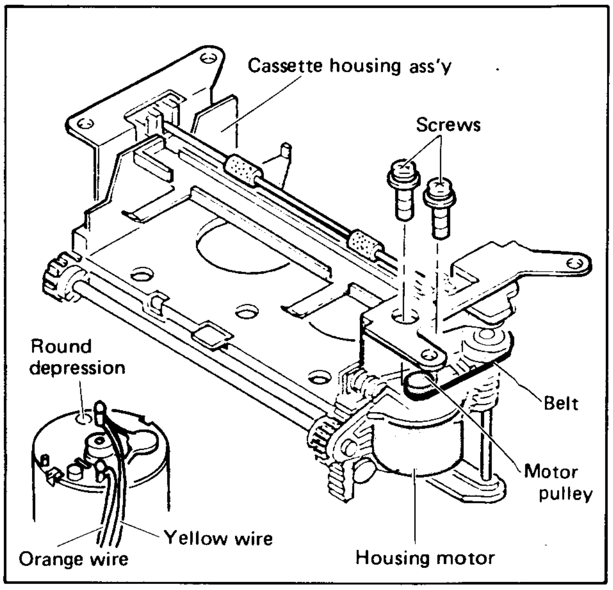

Cassette housing ass'y
Screws
Round depression
Belt
Motor pulley
Yellow wire
Orange wire
Housing motor

Fig. 4-18

4.6.8 Loading motor

1. Before replacing the loading motor, carefully observe its mounting condition (particularly wire polarities, positioning and clamping).
2. Take out screws Ⓐ and remove the loading gear assembly as shown in Fig. 4-19.
3. Unsolder the wires from the motor terminals.
4. Disengage the belt from the pulley, take out screws Ⓑ and remove the loading motor from the loading gear assembly.
5. Loosen the setscrew, remove the motor pulley and replace the loading motor.
6. Reassemble by reversing the above steps. Use a 0.5 mm thickness gauge to mount the motor pulley.
7. Turn the loading rings by hand to end of travel (loading end position) and install the loading gear assembly.

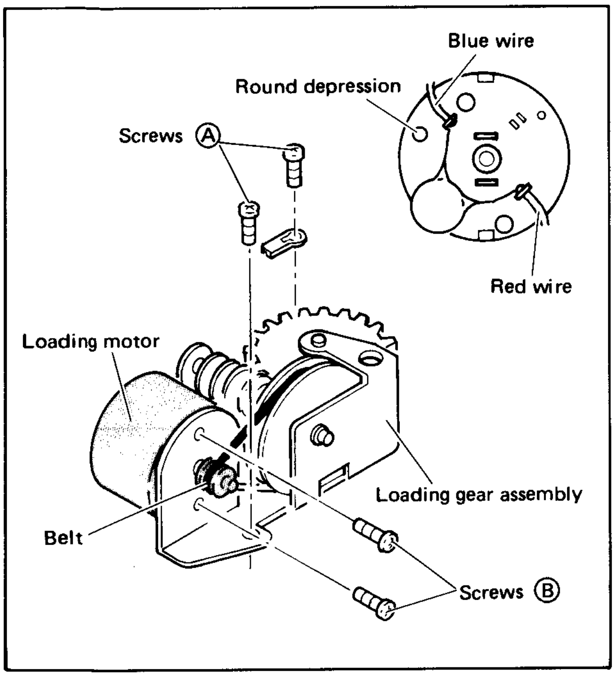

Blue wire
Round depression
Screws Ⓐ
Red wire
Loading motor
Loading gear assembly
Belt
Screws Ⓑ

Fig. 4-19 Loading motor replacement

8. Turn the loading motor pulley by hand to move the loading ring slightly in the unloading direction. Check for equal spacing between the supply pole guide and supply pole base, and between the take-up pole guide and take-up pole base. If not equal, the loading gear ass'y mounting position is incorrect. Repeat the above step 7.

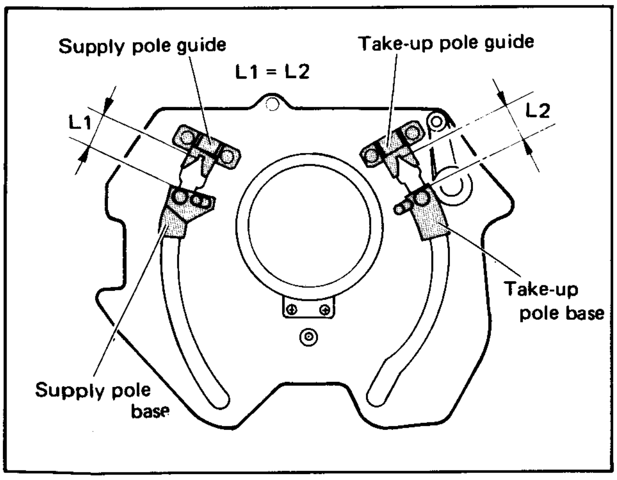

Supply pole guide
Take-up pole guide
L1 = L2
L1
L2
Take-up pole base
Supply pole base

Fig. 4-20 Loading ring check

4.6.9 Audio/control head subassembly

1. Take out screws Ⓐ, Ⓑ and Ⓒ to remove the A/C head subassembly. Use care regarding the coil springs as shown in Fig. 4-21.
2. Remove the A/C head circuit board. Use care not to damage the wires.
3. Replace the A/C head subassembly and reassemble by reversing the above steps.

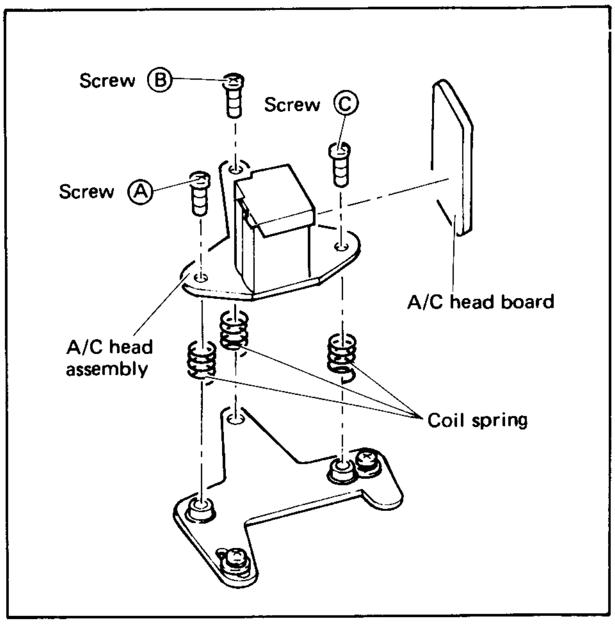

Screw Ⓑ
Screw Ⓒ
Screw Ⓐ
A/C head board
A/C head assembly
Coil spring

Fig. 4-21 A/C head replacement

4. Perform the following checks and adjustments.
   (1) Tape transport (section 4.8).
   (2) Interchangeability adjustment (section 4.9.1).
   (3) Audio/control head height (section 4.9.4).
   (4) Audio/control head azimuth (section 4.9.5).
   (5) Audio/control head position (section 4.9.6).
   (6) Audio adjustment (section 5.7).

4.7 CHECKS AND ADJUSTMENT

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following steps are therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.
In order to operate without cassette tape, remove the cassette housing (see section 4.6.1) and cover the tape start and end sensors with opaque material. Use the cassette switch lock jig to close the cassette switch as shown in Fig. 4-22. Be sure to remove the covers and jig after completing adjustment.

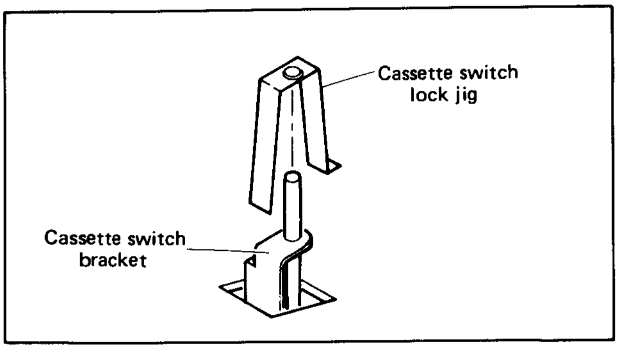

Cassette switch lock jig
Cassette switch bracket

Fig. 4-22 Cassette switch lock jig

4.7.1 Master plane jig setting

1. Remove the cassette housing referring to section 4.6.1.
2. Be sure to use the master plane jig part number PUJ42146 for this machine.
3. As shown in Fig. 4-23, position the master plane jig with respect to the reference shaft, pinch roller shaft and the stud.

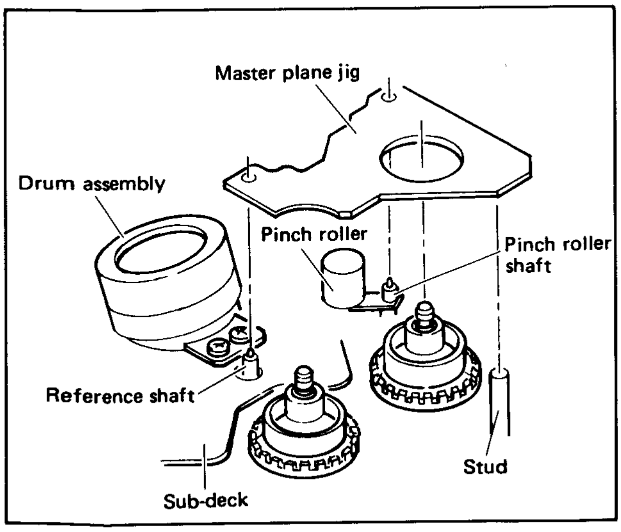

Master plane jig
Drum assembly
Pinch roller
Pinch roller shaft
Reference shaft
Stud
Sub-deck

Fig. 4-23 Master plane jig setting

4.7.2 Reel disk height

1. Set the master plane jig.
2. Use the height gauge (PUJ42147-2) to check the reel disk height. Measure at 2 places 90° apart. When measuring, press the reel disk downward to compensate for mechanical play.
3. The correct height is between planes A and B, as shown in Fig. 4-24. If necessary, loosen the setscrew and adjust to the correct height.

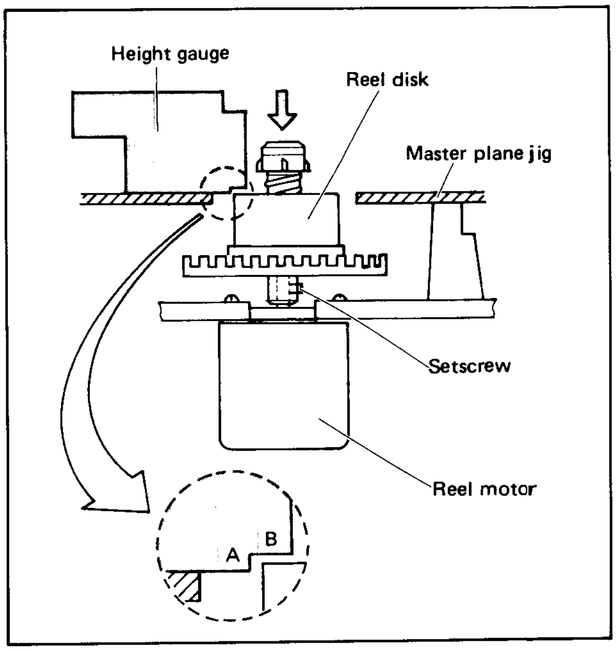

Height gauge
Reel disk
Master plane jig
Setscrew
Reel motor
A
B

Fig. 4-24 Reel disk height adjustment

4.7.3 Supply guide pole height

1. Set the height gauge (PUJ42147-2) on the sub-deck and check the perpendicularity.
2. Check the height of the lower face of the upper flange. If necessary, carefully adjust by turning the nut.
3. If guide pole height has been adjusted, tape transport adjustments are required (see section 4.8).

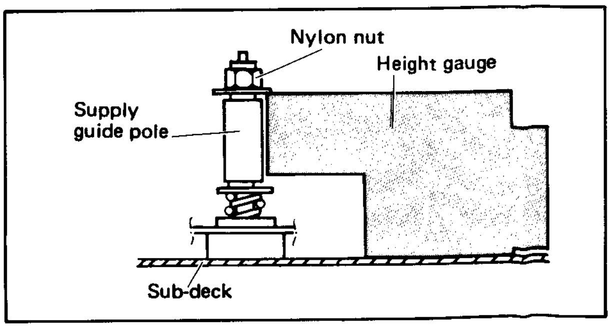

Nylon nut
Height gauge
Supply guide pole
Sub-deck

Fig. 4-25 Supply guide pole height adjustment

4.7.4 Tape guide height

1. Set the height gauge (PUJ42147-2) on the sub-deck and check the perpendicularity.
2. Check the height of the lower face of the upper flange. If necessary, carefully adjust by turning the nut of the tape guide arm ass'y.
3. If tape guide height has been adjusted, tape transport adjustments are required (see section 4.8).

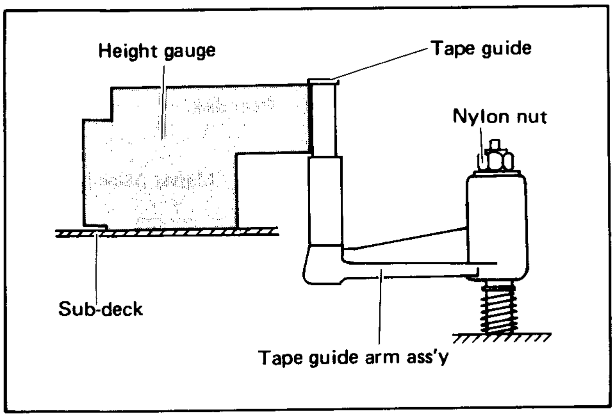

Height gauge
Tape guide
Nylon nut
Sub-deck
Tape guide arm ass'y

Fig. 4-26 Tape guide height adjustment

4.7.5 Pinch roller

1. By hand, press the pinch roller arm to the point just before it contacts the capstan.
2. Check for parallel between the pinch roller and capstan. If necessary, adjust by turning the setscrew of the pinch roller arm ass'y. A space at the top or bottom of within 0.1 mm is acceptable.

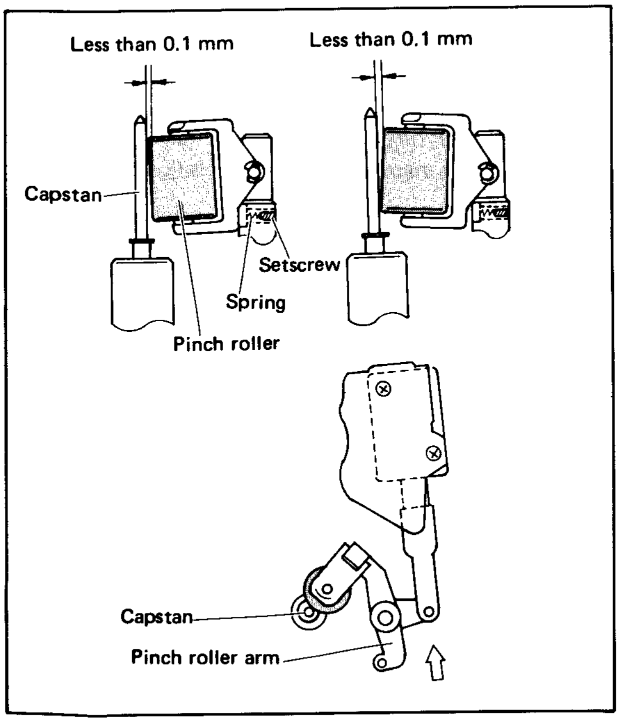

Less than 0.1 mm
Less than 0.1 mm
Capstan
Setscrew
Spring
Pinch roller
Capstan
Pinch roller arm

Fig. 4-27

4.7.6 Differential transformer positioning

1. Without a cassette tape, supply power and set for the Play mode. When the loading is completed, turn off the power.
2. Confirm that the tension arm contacts the base of the supply guide pin.
3. Check that the clearance between E-ring and differential transformer is 0–0.1 mm. This is more easily checked from the rear side.
   If not, adjust by turning the socket bolt with a 2.4 mm hex key.

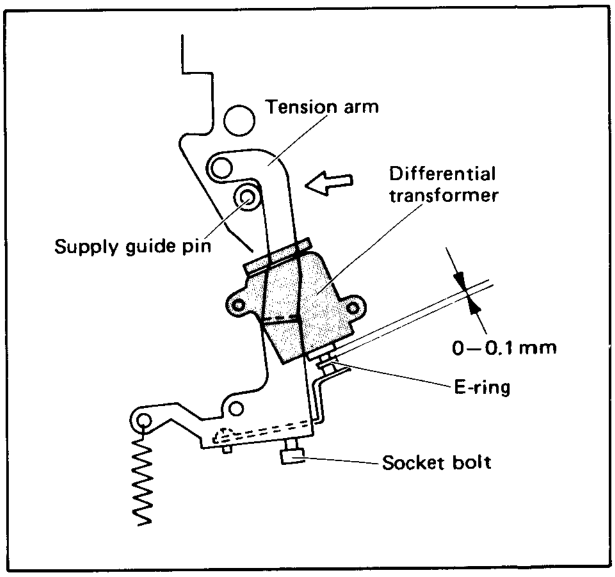

Tension arm
Differential transformer
Supply guide pin
0–0.1 mm
E-ring
Socket bolt

Fig. 4-28

4.7.7 Pinch roller solenoid

1. Without a cassette tape, supply power and set for the Play mode.
2. Check that the space between the solenoid lever and spring is 0.5–1 mm as shown in Fig. 4-29.

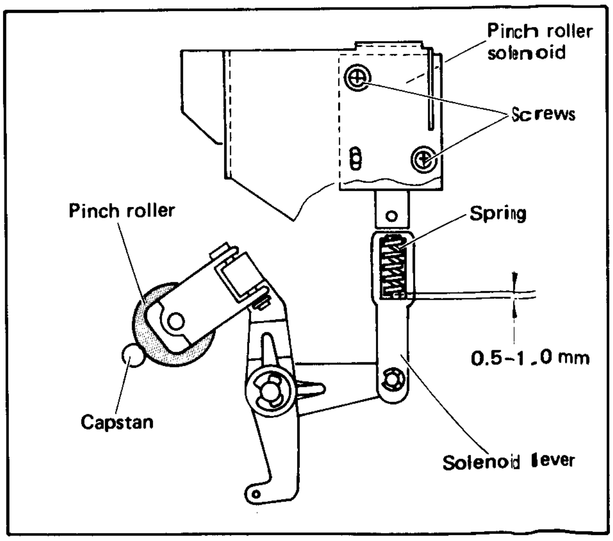

Pinch roller solenoid
Screws
Pinch roller
Spring
0.5-1.0 mm
Capstan
Solenoid lever

Fig. 4-29

3. If necessary, adjust solenoid position by loosening the two screws, then tighten the two screws again.

4.7.8 Tape guide (Reverse) solenoid

1. Use a blank tape, and set for the Search Reverse mode.
2. Check that the tape guide does not contact the video tape and the pinch roller. Then check that the tape guide contacts the sub-deck during Play and Search forward mode.
3. If not, adjust solenoid position by loosening the two screws, then tighten the two screws again.

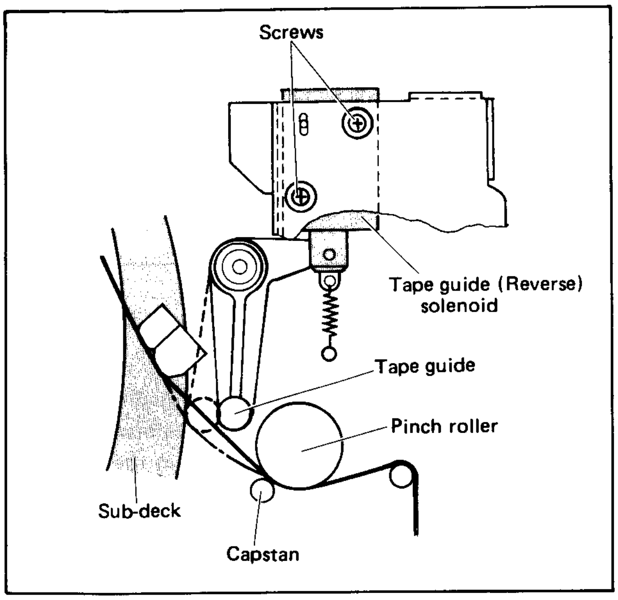


Fig. 4-30

4.7.9 Cassette switch height adjustment

- This adjustment is usually not required except when the cassette switch has been replaced.
- If the cassette switch is too low, the cassette tape will become automatically ejected when inserted in the machine.

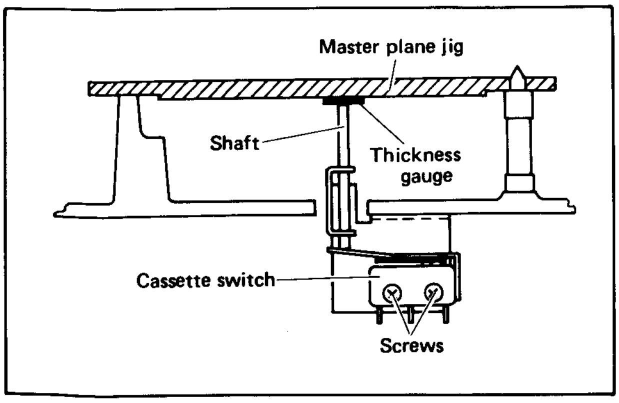


Fig. 4-31

- If the cassette switch is too high, the cassette cannot drop down to the required position for proper tape transport.

1. Remove the cassette housing ass'y.
2. Place 0.7 mm thickness gauge (PUJ48017) flush with the bottom of the master plane jig. Slowly set the jig in place and confirm that the switch does not close (listen for clicking sound).
3. Similarly, use the 1.5 mm and 0.3 mm thickness gauges and confirm the clicking sound.
4. If the conditions of the above steps are not fulfilled, loosen the 2 screws and adjust the cassette switch position.

4.7.10 Pulse generator (PG) head positioning

1. Check that the clearance between the pulse generator head and the magnet is 0.3 mm.
2. If not, loosen the screw and adjust the PG head position using a 0.3 mm thickness gauge.

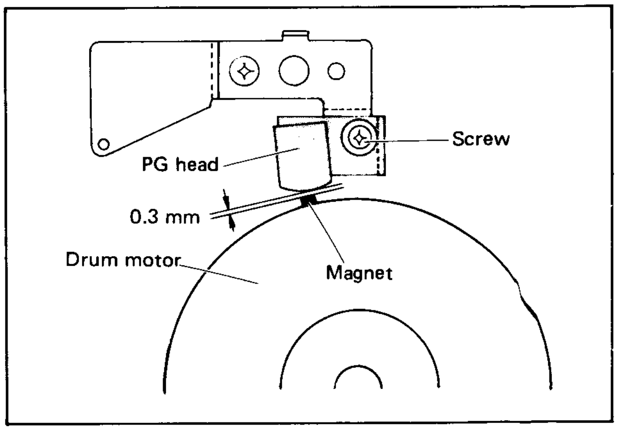


Fig. 4-32

4.7.11 Torque

- Perform the following checks and adjustment after completing reel servo adjustment.

A. Loading supply back tension

1. Use the cassette torque meter (PUJ42881) and set for the Play mode as if it were a cassette tape.
2. During loading, check that the left side meter indicates 15 ± 6 g-cm.
3. If not, adjust R29 of the reel servo board for 15 ± 6 g-cm.

B. Playback back tension

1. Use the cassette torque meter (PUJ42881) and set for the Play mode as if it were a cassette tape.
2. During the Play mode, check that the left side meter indicates 41 ± 6 g-cm and the TP-1 level of reel servo board is 0.29–0.33 Vp-p. If not, perform the following steps.

3. Confirm section 4.7.6 'Differential transformer positioning' and section 6.4.5 'Supply det. level'.
4. Using the cassette torque meter, set for the Play mode and adjust R167 of the reel servo board for 41 ± 6 g-cm.
5. When 41 ± 6 g-cm back tension is obtained, check that the level at TP-1 of the reel servo bard is 0.29–0.33 Vp-p during the Play mode. If not, adjust the adjustment lever position carefully, then repeat steps 4 and 5 until the specified results are obtained. In this case, it is necessary to remove the cassette housing.
6. If 41 ± 6 g-cm back tension cannot be obtained by step 4, adjust the adjustment lever position carefully, then repeat steps 4 and 5 until the specified results are obtained.
7. Figure 4-33 shows the state after completing the adjustment.

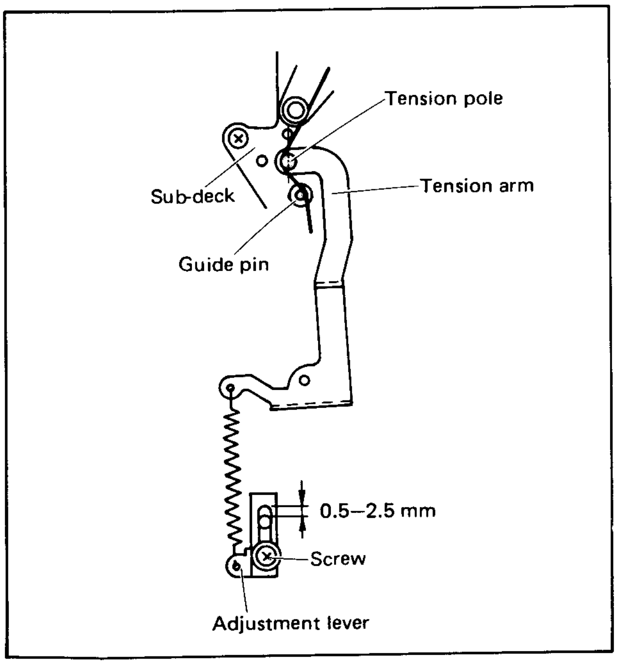


Fig. 4-33

C. Playback take-up torque
1. Use the cassette torque meter (PUJ42881) and set for the Play mode as if it were a cassette tape.
2. During the Play mode, check that the right side meter indicates 100 ± 20 g-cm.
3. If not, adjust R142 of the reel servo board for 100 ± 20 g-cm.

D. Fast Forward (FF) and Rewind (REW) torque
1. Use the torque gauge (PUJ48075-2) and set it on the take-up reel disk.
2. Hold the torque gauge, then set for the FF mode.
3. Relax the grip on the torque gauge so that the indicator needle and scale rotate at equal speeds, then read the indication. The correct value is 300 g-cm or more.
4. In the same manner, check the rewind mode.
5. If incorrect value, check the reel servo circuit.

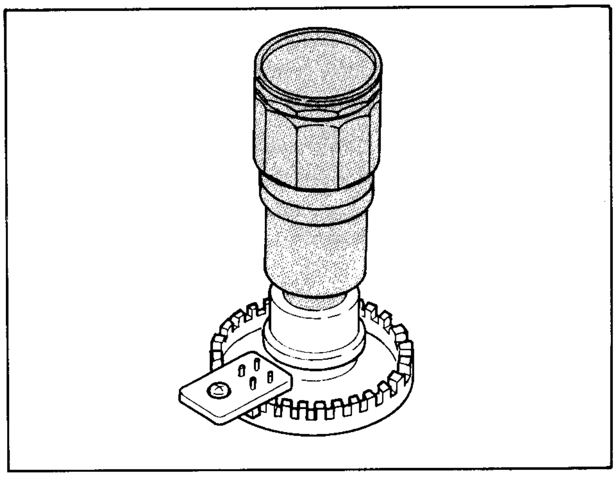


Fig. 4-34

4.7.12 Upper drum eccentricity

- If the upper drum is mounted even slightly out of center with respect to the drum shaft, relative head-to-tape speed becomes inconsistent within the rotation period of the upper drum. This can cause jitter and picture distortion.
- After the upper drum is replaced, perform the following adjustments.

1. Cover the end sensor with opaque material, supply power and set for the Play mode without a cassette tape. After completion of loading, switch off the power.
2. Set the micro-checker (PUJ49712-2) on the guide pin as shown in Fig. 4-35. Use the accessory hex wrench (metric) to tighten the fixing screw.

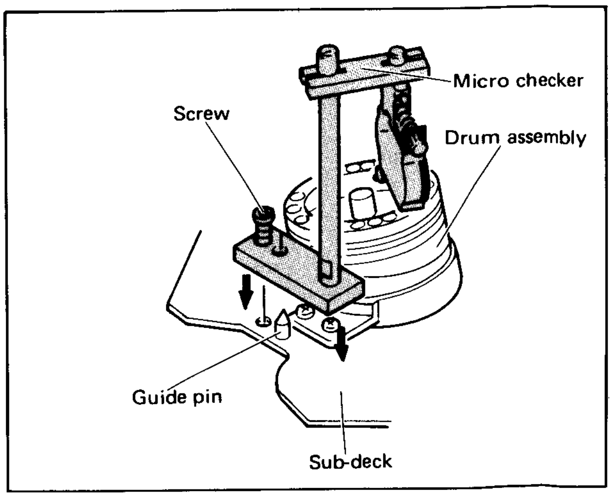


Fig. 4-35

IMPORTANT: Micro-checker is a test jig for measuring eccentricity of the upper drum.
When using this jig, observe the following precautions.

- *As the instrument is extremely precise, use special care not to drop it or subject to strong vibration.*
- *Do not apply strong force to the test probe.*
- *The position and direction of the holder have been preset. Do not readjust or disassemble the instrument.*
- *The outer frame of the scale can be turned about 10 scale divisions in either direction. Do not turn it forcibly (force greater than 300 g-cm).*
- *Use care that the jig does not contact the video heads.*
- *Before mounting, turn the fine adjust knob counter clockwise (to where the spring tension is no longer felt).*
- *When mounting, observe that the test probe movement direction is toward the center portion of the upper drum.*
- *Do NOT apply power while the jig is installed.*

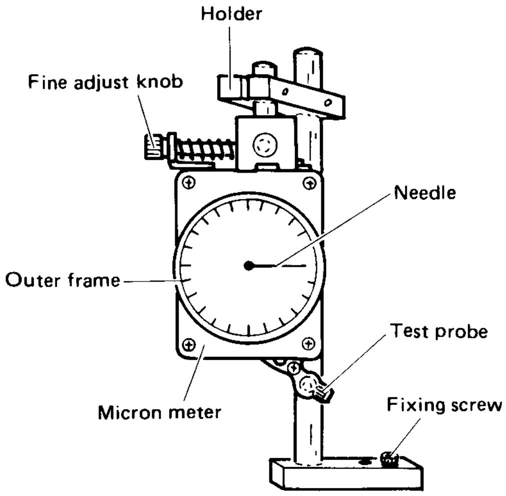


Fig. 4-36 Micro-checker

3. Gradually turn the fine adjust knob clockwise so that the test probe contacts the drum. The dial indicator registers zero on the scale.
4. While using care not to apply lateral pressure to the drum, slowly turn the upper drum and read the deviations indicated by the micro checker.
5. Check for needle deflection within 4 microns. If an abrasive sound is heard during measurement, check for dust or grit adhering to the test probe or drum face.
6. If deviation is greater than 4 microns, turn the fine adjust knob counterclockwise to disengage the test probe from the drum. Loosen the 2 screws of the upper drum, carefully adjust the position, then retighten the 2 screws in a balanced manner. Afterwards, again use the micro-checker to check the eccentricity.
7. After using, turn the fine adjust knob counterclockwise and remove the micro-checker.
8. Supply power and set for the Stop mode. Be sure to remove the cover.
9. Connect oscilloscope to TP-8 of the Pre/Rec board.
10. Gradually turn the TRACKING control and confirm simultaneously maximum CH-1 and CH-2 waveforms.
11. If difference is obvious, remove the upper drum, clean the bottom face of the upper drum and the lower drum flywheel. Reinstall and repeat above steps 1 to 10. Refer to section 4.6.2.

4.8 TAPE TRANSPORT

The tape transport system has been precisely adjusted at the factory and normally does not require readjustment. The following steps are therefore necessary only in case of severe usage or when replacing parts affecting the tape transport system.

4.8.1 Tape transport check

1. Employ a 180 minute tape and check at tape beginning and ending portion according to the following steps.
2. Operate the machine between Play and Stop modes several times.
   During Loading and Unloading, observe the tape at the supply and take-up guide rollers, supply guide pole and tape guide.
   Confirm absence of curling, wrinkling, etc. as shown in Fig. 4-38.

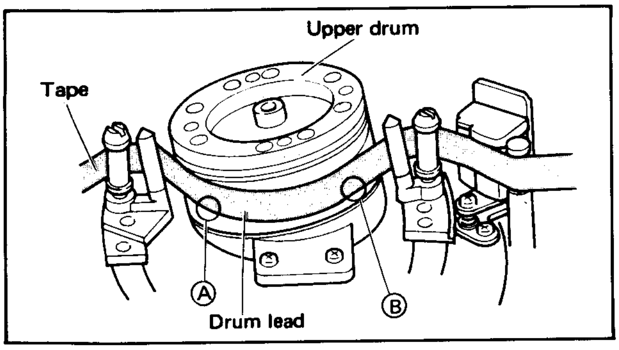


Fig. 4-37 Drum lead check-1

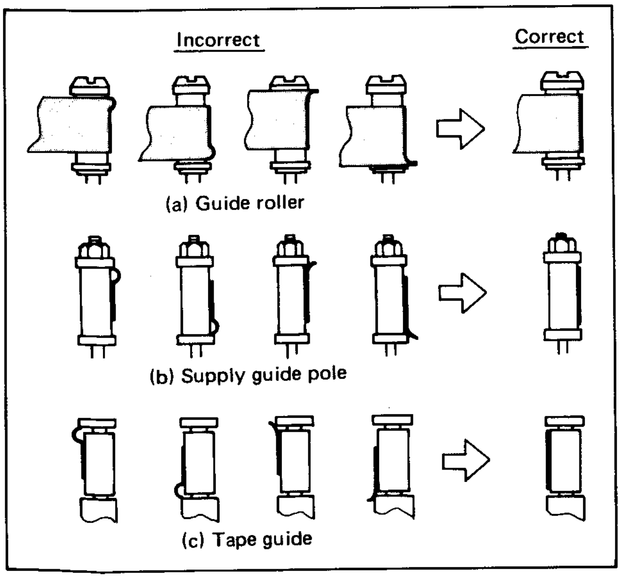


Fig. 4-38 Guide roller and Guide pole

3. Observe the tape as it becomes wrapped around drum during loading and as it separates from the drum during unloading.
   Confirm absence of damage to the tape at points Ⓐ and Ⓑ as shown in Fig. 4-37 and absence of contact noise between head tips and tape edge.
4. During Play mode, observe tape at the input and output portions (Ⓒ and Ⓓ in Fig. 4-39) of the head drum lead.
   Confirm that the tape slips neither upward nor downward with respect to the lead as shown in Fig. 4-40.

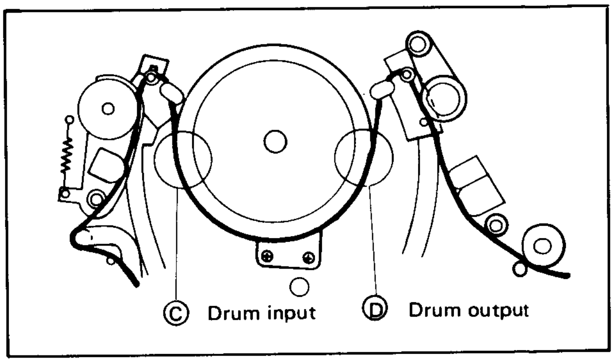


Fig. 4-39 Tape transport check

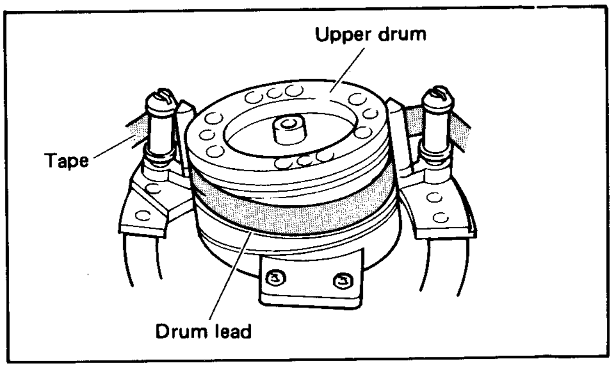


Fig. 4-40 Drum lead check-2

NOTES:

1. Slips upward : sound becomes produced by contact between tips of rotating heads and edge of tape.

2. Slips downward : tape curls or wrinkles from contacting lead face (sound may also be produced).

5. During Play and search FWD modes, observe the tape at the supply guide pole, supply guide roller, take-up guide roller and tape guide.
   Confirm absence of curling, wrinkling, etc. as shown in Fig. 4-38.
6. During Search REV mode, confirm that the tape guide does not contact the tape and absence of curling, wrinkling, etc. at the supply guide pole, supply guide roller and take-up guide roller as shown in Fig. 4-38.

4.8.2 Tape transport adjustments

Perform only if defects are noted during tape transport check (4.8.1).

A: Guide roller height

1. Slightly loosen setscrews of the supply and take-up guide rollers as shown in Fig. 4-41.
2. Use cassette tape and set for Play mode.
3. With a slotted screwdriver, slightly turn the supply guide roller (do not turn more than 180° at a time) and adjust so that at the drum input, the tape travels smoothly in the drum lead without slipping upwards or downwards.
4. Similarly, adjust the take-up guide roller for the drum output.

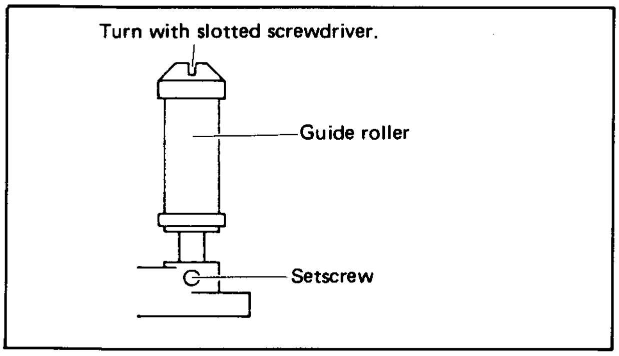


Fig. 4-41 Guide roller height

NOTES:

1. Loosen the setscrews only enough to allow the guide rollers to be turned.
   If excessively loose, tape motion may turn the rollers inadvertently.
2. Turn the rollers carefully to avoid damage to the tape.

B: Supply guide pole height

1. Use cassette tape and set for Play mode.
2. Use a nutdriver to turn the supply guide pole to align the upper flange of the guide pole with the upper edge of the tape as shown by (b) of Fig. 4-38.

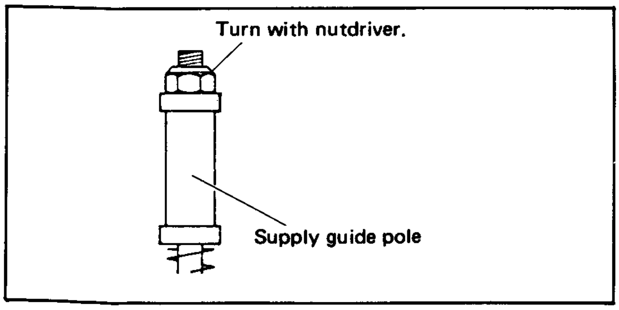


Fig. 4-42 Supply guide pole height

However, this adjustment must be performed so that at the same time, the upper flange remains within ±0.5 mm of the height adjusting jig portion shown in Fig. 4-25.
If there is a large discrepancy, check the height of the supply reel disk, tension pole and other mechanical components.

C. Tape guide height

1. Use cassette tape and set for Play mode.
2. Use a nutdriver to turn the nylon nut and adjust for smooth transport at the tape guide.

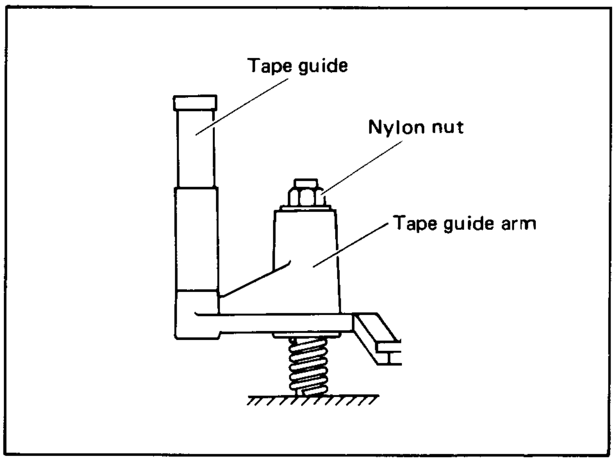


Fig. 4-43 Tape guide height

4.9 INTERCHANGEABILITY ADJUSTMENT

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following steps are therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.
Before using alignment tape, employ cassette tape and confirm correct tape transport referring to section 4.8.

4.9.1 Preliminary checks

1. Connect oscilloscope to PRE/REC TP-8 (FM OUT).
   At this time, trigger the oscilloscope externally with the signal (25 Hz square wave) from TP-12 of the drum servo board.
2. Play stairstep portion of the JVC alignment tape MH-2.
3. Turn the tracking control and adjust for maximum FM output at PRE/REC TP-8.
   Set the Tracking control to AUTO (center click position) and confirm that nearly maximum output is obtained.
4. Turn the Tracking control for maximum FM output.
5. Read the maximum FM level (a) and minimum FM level (b), then confirm that:

   $\frac{b}{a} \geqq 0.8\ (\geqq -2\ \text{dB})$

   If the waveform is serrated, read the value at the most uniform serrations as shown at left in Fig. 4-44.
6. Read the values at points (c) and (d) [drum input and output] and confirm that:

   $\frac{c}{a} \geqq 0.64$ and $\frac{d}{a} \geqq 0.64\ (\geqq -4\ \text{dB})$

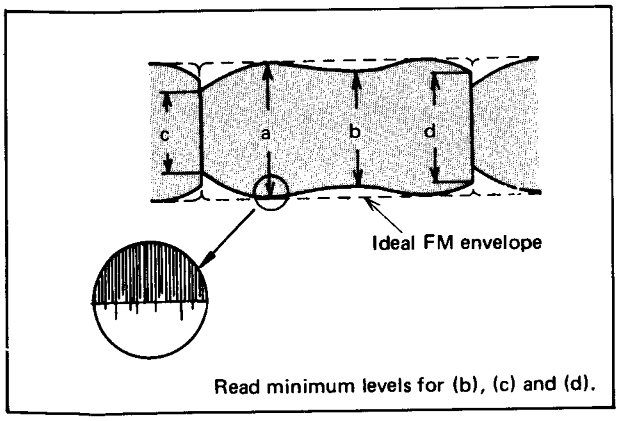


Fig. 4-44 FM waveform (max. output)

7. Turn the Tracking control from end to end. The waveform variation should be nearly parallel as shown in Fig. 4-45, not in Fig. 4-46.
8. If steps 5 to 7 above are unsatisfied, adjustments are required.
   Perform adjustments of section 4.9.2 to 4.9.7.

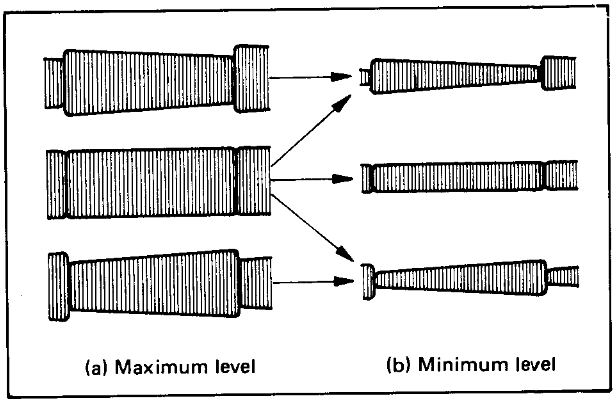


Fig. 4-45 Normal waveform examples

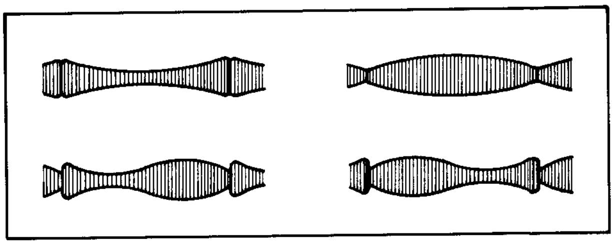


Fig. 4-46 Incorrect waveform examples

4.9.2 Preliminary adjustments

1. Loosen the setscrews of the supply guide roller and take-up guide roller.
   If the guide rollers turn freely, slightly tighten the setscrews.
2. Connect oscilloscope to PRE/REC TP-8 (FM OUT). Trigger the oscilloscope externally with the signal from drum servo TP-12.
3. Play stairstep segment of the JVC alignment tape MH-2.

Drum input

4. Observe oscilloscope display and adjust the Tracking control for maximum FM output.
5. Refer to Fig. 4-47. Examples of incorrect waveforms are shown by A and B.
   Use a slotted screwdriver to adjust the supply guide roller so that the rising portion (drum input portion) of the waveform becomes flat as shown by C.

   NOTES:
   1) If the guide roller turns freely, tighten the setscrew slightly.

2) Be sure to adjust the guide roller only by small amounts at a time in order to avoid damaging the alignment tape.
In addition to observing the waveform, confirm absence of tape slippage or curling at the drum lead and guide poles.

3) At the supply guide pole, if the tape separates from the guide or wrinkling occurs, adjust the guide pole height.

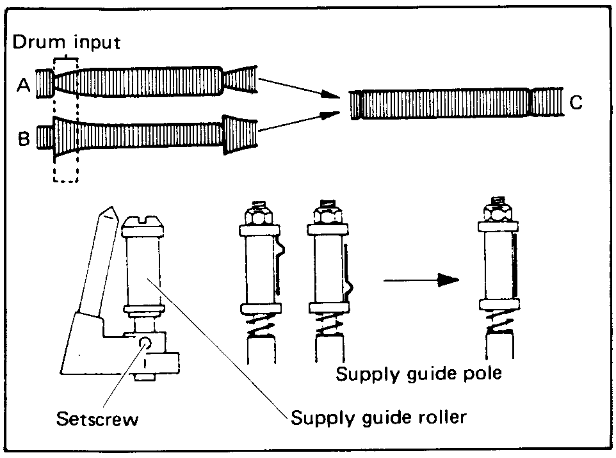


Fig. 4-47 Drum input adjustment

Drum output

6. In the same manner as for the drum input, turn the take-up guide roller to adjust the falling portion (drum output portion) of the FM waveform. Incorrect examples are shown by D and E in Fig. 4-48, while F indicates the correct adjustment.
7. If the tape separates from the tape guide or wrinkling occurs at the tape guide, adjust by turning screw Ⓒ of the audio/control head as shown in Fig. 4-48.
8. Carefully and evenly adjust screws Ⓐ , Ⓑ and Ⓒ to align the audio/control head height with the tape as shown in Fig. 4-49.
9. Confirm that the small wrinkles are not produced at the tape guide.

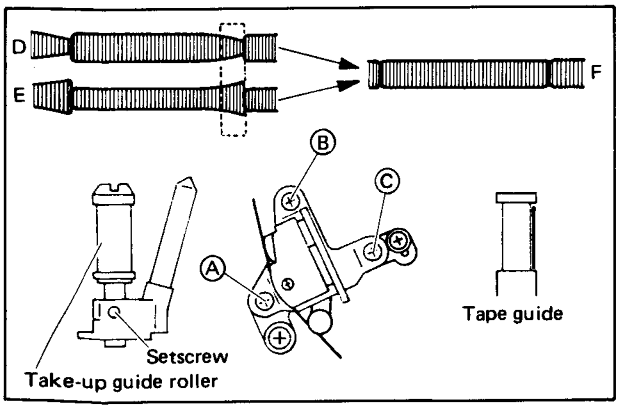


Fig. 4-48 Drum output adjustment

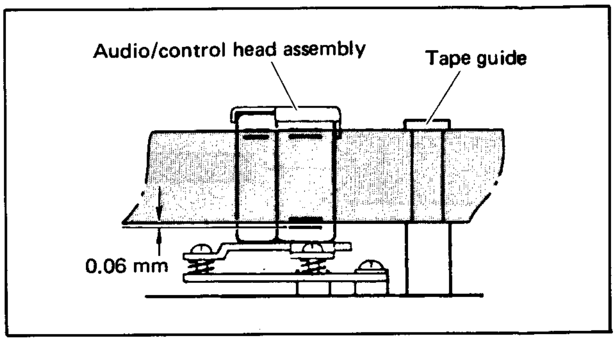


Fig. 4-49 Audio/control head height

4.9.3 Fine adjustment

1. Connect oscilloscope to PRE/REC TP-8 (FM OUT). Observe FM waveform and adjust the Tracking control for minimum FM output level.
2. If the waveform becomes as shown by A or B of Fig. 4-50, carefully adjust the supply guide roller height so that the waveform becomes as shown by E, F or G of Fig. 4-51.
   At this time, if the waveform fluctuates, adjust to the point of minimum fluctuation.
3. It the FM waveform appears as shown by C or D in Fig. 4-50, carefully adjust the take-up guide roller height to obtain a waveform such as shown by E,F or G of Fig. 4-51.
   At this time, if the waveform fluctuates, adjust to the point of minimum fluctuation.
4. Vary the Tracking control from maximum to minimum FM output. The waveform variation should be nearly parallel as shown in Fig. 4-52. If not, repeat section 4.9.2 and 4.9.3.
5. Confirm audio/control head height, azimuth and horizontal position. See sections 4.9.4 to 4.9.6.

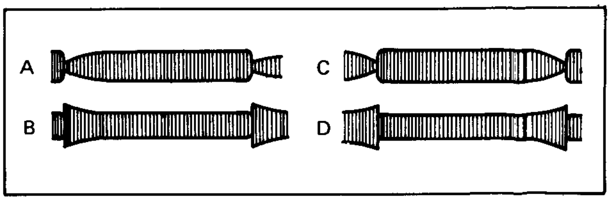


Fig. 4-50 Minimum FM output (incorrect examples)

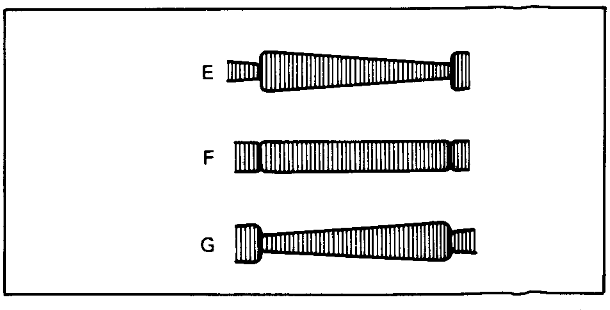


Fig. 4-51 Minimum FM output (correct examples)

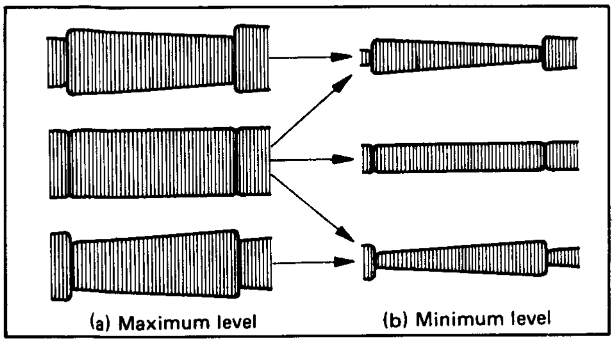


Fig. 4-52 Correct waveform

NOTE: Setscrew tightening

1. *Since the guide rollers are easily moved, use care when securing the guide rollers.*
2. *Perform in Stop mode.*
3. *After tightening the setscrews, again perform preliminary checks, section 4.9.1.*

4.9.4 Audio/control head height

- Incorrect audio/control head height can impair audio signal-to-noise ratio when playing back a pre-recorded tape.

1. Connect an AC VTVM to the AUDIO OUT CH-1 connector.
2. Play 1 kHz segment of the alignment tape MH-2.
3. Check that the audio output level increase does not exceed 0.5 dB as the tape is lightly pressed down at point Ⓐ as shown in Fig. 4-53.
4. In the same manner, check that the audio CH-2 level increase does not exceed 0.5 dB as the tape is lightly pushed up at point Ⓑ as shown in Fig. 4-53.
5. If level increase is more than 0.5 dB in step 3 or 4, perform following adjustment.

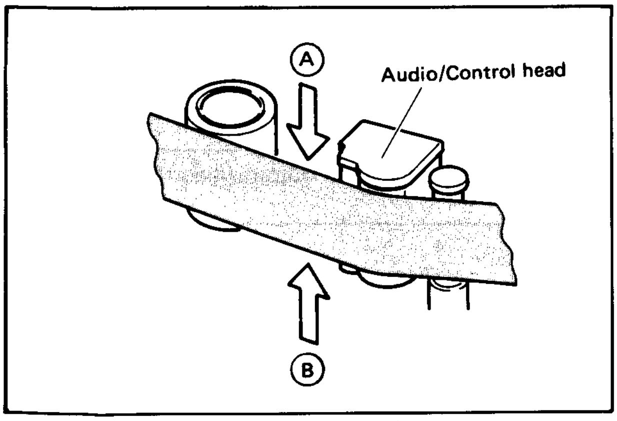


Fig. 4-53 Audio head height check

6. Connect CH-1 probe of the oscilloscope to AUDIO OUT CH-1 connector (or TP-10 of Audio board) and CH-2 probe to AUDIO OUT CH-2 connector (or TP-11 of Audio board).
7. Adjust the oscilloscope for equal maximum levels for CH-1, when the tape is lightly pressed downward at point A, and CH-2, when the tape is lightly pressed upward at point B.
8. Turn screws Ⓐ, Ⓑ and Ⓒ in succession by small and equal increments at a time and adjust for the same levels between CH-1 and CH-2.
9. If tape curling, wrinkling, etc. occurs at the tape guide, adjust screw Ⓒ so that the tape travels smoothly at tape guide and level fluctuations are minimum.
10. Repeat steps 6 to 9, then perform section 4.9.5.

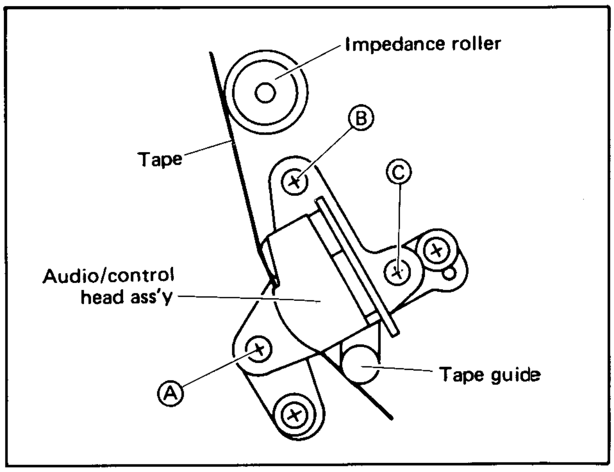


Fig. 4-54 A/C head height adjustment

4.9.5 Audio/control head azimuth

- Perform the following steps only after completing section 4.9.4.

1. Connect CH-1 probe of the oscilloscope to AUDIO OUT CH-1 connector (or TP-10 of Audio board) and CH-2 probe to AUDIO OUT CH-2 connector (or TP-11 of Audio board).
2. Play 6 kHz segment of the alignment tape MH-2.
3. Adjust screw Ⓑ (shown in Fig. 4-54 for both maximum output levels and absence of phase difference between CH-1 and CH-2.
4. Confirm the audio/control head height (section 4.9.4).

4.9.6 Audio/control head position

- The audio/control head must be adjusted to the specified position in order to ensure pre-recorded tape interchangeability.
- Perform the following steps only after completing section 4.9.1 through 4.9.5.

1. Connect oscilloscope to TP-8 of PRE/REC board.
2. Play stairstep segment of the adjustment tape MH-2.
3. Turn the Tracking control and confirm that the maximum FM level is obtained at the center click position.
4. If not, adjust as follows.
5. Set the Tracking control to center click position.
6. Loosen two screws (Ⓓ and Ⓔ) and slide the audio/control head assembly fully in the direction of the take-up impedance roller as shown in Fig. 4-55.

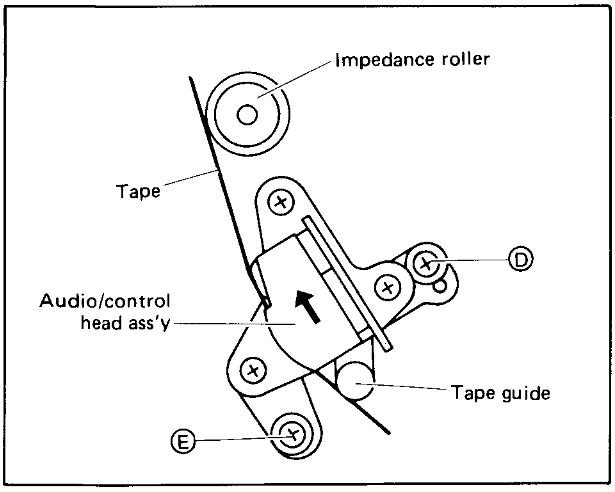


Fig. 4-55

7. Slightly tighten the two screws and play stairstep segment of the alignment tape MH-2.
8. Set the audio/control head position tool (PUJ-47351) over screw Ⓓ and insert the pin of the tool into the hole at the side of the screw.
9. Slowly turn the tool and set the audio/control head to the position where first maximum peak FM level is obtained.
10. Secure the two screws Ⓓ and Ⓔ.
11. Confirm sections 4.9.1 through 4.9.5.

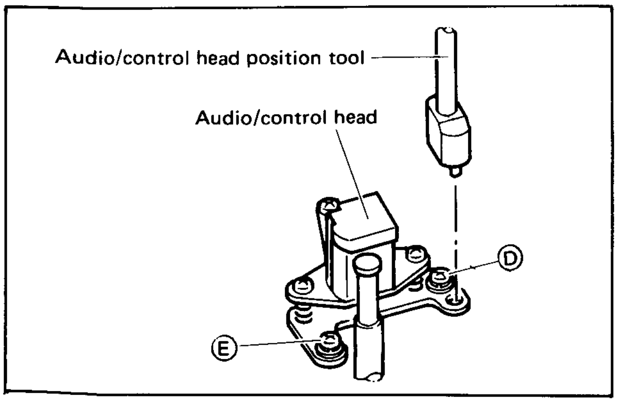


Fig. 4-56

4.9.7 Final checks

1. Confirm preliminary checks (section 4.9.1).
2. Check recording and playback switching point (section 5.5.8 and 5.5.10).
3. Check signal systems by referring to section 6, Electrical Adjustment.

SECTION 5
ELECTRICAL ADJUSTMENTS

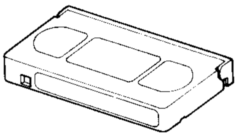
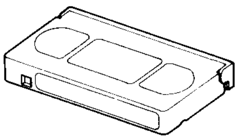
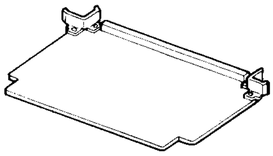
5.1 PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

5.1.1 Required test equipment and jig

1. Digital voltmeter: HEWLETT-PACKARD Model 3476A/B or equivalent
2. Oscilloscope: Wide-band, Dual-trace
3. Signal generator: Color bar, Stairstep
4. Frequency counter: HEWLETT-PACKARD Model 5381A or equivalent
5. Regulated DC power supply
6. Audio generator : Wide-band
7. Alignment tape: JVC MH-2/MH-5/MH-6/MHVE-3
8. Extension board : PUJ25380

NOTE: Be sure to first check for smooth and proper tape transport before using the alignment tape.

Alignment tape MH-2/MH-5	Alignment tape MH-6/MHVE-3	Extension board PUJ25380
		

Note: Use the Extension board for adjusting the servo board.

5.1.2 JVC alignment tape contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairstep (CCIR)	6 kHz	• Interchangeability checks and adjustments • Servo circuit checks and adjustments • Audio head azimuth adjustments
2	5 minutes	(none)	3 kHz	• Tape speed checks • Wow and flutter checks
3	10 minutes	PAL Color bar	1 kHz	• Video signal playback circuit checks and adjustments • Audio signal playback circuit checks and adjustments
4	3 minutes	RF sweep (PAL)	(none)	• Video head resonance checks Marker: 2 MHz, 4 MHz, 5 MHz

Table 5-1 MH-2 contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	5 minutes	NTSC Stairstep	(none)	● Mechanical interchangeability checks and adjustments ● Servo circuit checks and adjustments NOTE: Set the TRACKING control to the center (click) position.
2	10 mimutes	NTSC Colour bar	1 kHz	● Video signal playback circuit checks and adjustments ● Audio signal playback circuit checks. NOTE: Set the TRACKING control to MANUAL and adjust for maximum FM output level.
3	1 minutes	(none)	(none)	–
4	10 minutes	SECAM Colour bar	(none)	● Video signal playback circuit checks and adjustments. NOTE: Set the TRACKING control to MANUAL and adjust for maximum FM output level.

Table 5-2 MH-5 contents

Segment	Playback Time	Video signal	Audio signal	Applications
1	2 minutes	NTSC Color sweep	400 Hz	● Video frequency response playback circuit checks and adjustments ● Audio frequency response playback circuit checks and adjustments
2	2 minutes		100 Hz	
3	2 minutes		10 kHz	
4	4 minutes		(none)	

Table 5-3 MH-6 contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	20 minutes	PAL Color sweep	(none)	● Video frequency response playback circuit checks and adjustment

Table 5-4 MHVE-3 contents

5.1.3 Check and Adjustment steps

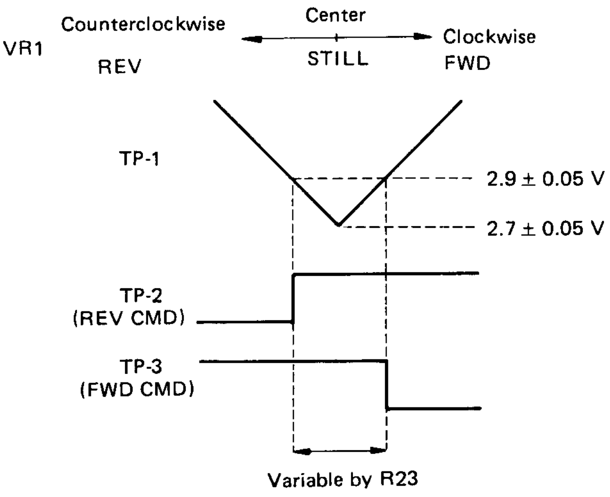
The check and adjustment steps are provided in the following in the form of charts. For clarity, the nomenclature used in the charts is outlined below.

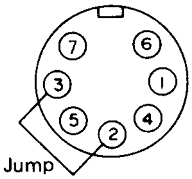
No.	Checks and adjustments are numbered in the recommended sequence in which they are to be performed. *Recorder unit only. When adjusting player unit, for steps which call for recording and playback, play the alignment tape.
Item	Name assigned to the particular check and adjustment step.
Check Point	Location to which measuring instrument (oscilloscope unless otherwise noted) is to be connected.
Adjustment Parts	Variable component (resistor, capacitor, etc.) to be adjusted in this step. Dash (—) indicates check only.
Signal	Input signal required to perform adjustment. Dash (—) indicates that special signal is not required.
Color bar	Color bar signal as video input
Stairstep	Stairstep signal as video input
1 kHz	Supply a 1 kHz sinewave as audio input signal
MH-2 Color bar	Play color bar segment of JVC MH-2 alignment tape
MH-2/MH-5 Stairstep	Play stairstep segment of JVC MH-2/ MH-5 alignment tape
MH-2 1 kHz	Play 1 kHz audio signal segment of JVC MH-2 alignment tape.
MHVE-3 Color sweep	Play color sweep segment of JVC MHVE-3 alignment tape.
MH-6 Color sweep	Play color sweep segment of JVC MH-6 alignment tape.
MH-6 400 Hz	Play 400 Hz audio signal segment of JVC MH-6 alignment tape.
MH-6 100 Hz	Play 100 Hz audio signal segment of JVC MH-6 alignment tape.
MH-6 10 kHz	Play 10 kHz audio signal segment of JVC MH-6 alignment tape.
Mode	Equipment operating mode at time of check or adjustment.
B/W	Set the VIDEO MODE switch to B/W position.
PAL	Set the VIDEO SYSTEM switch to PAL position.
SECAM	Set the VIDEO SYSTEM switch to SECAM position.
NTSC	Set the VIDEO SYSTEM switch to NTSC position.
STOP	Power on and machine in Stop mode
REC	Recording mode
P.B.	Play mode
REC → (another mode)	Use blank tape, record, then play back in the mode specified.
SLOW	Slow motion playback
STILL	Still mode playback
SEARCH	Shuttle Search (S-FWD and S-REV) playback mode
AUDIO DUB	Audio dubbing mode
Description and Waveform	This column provides an explanation of the step, notes, adjustment values and waveform diagrams.

5.2 POWER SUPPLY CIRCUIT

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	12 V DC output voltage	TP-2 Power	R7 Power	–	PLAY	1. Connect the digital voltmeter to TP-2 of the power supply board. 2. Adjust R7 (12 V REG) for 12 ± 0.2 V.
2	12.5 V DC output voltage	TP-3 Power	–	–	PLAY	1. Connect the digital voltmeter to TP-3 of the power supply board. 2. Confirm that the DC voltage becomes 12.5 ± 0.5 V.
3	18.5 V DC output voltage	Pin 3 of P708 connector Power	–	–	PLAY	1. Connect the digital voltmeter to pin 3 of P708 connector of the power supply board. 2. Confirm that the DC voltage becomes 18.5 ± 1 V.
4	22 V DC output voltage	TP-4 Power	–	–	PLAY	1. Connect the digital voltmeter to TP-4 of the power supply board. 2. Check for DC voltage of 22 ± 1.2 V.

5.3 SYSTEM CONTROL (SYSCON) CIRCUIT

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	IC14 clock frequency	Pin 1 of IC14 Syscon	–	–	STOP	1. Connect frequency counter to pin 1 of IC14 and confirm that the frequency becomes 400 ± 2 kHz.
2	IC25 clock frequency	Pin 1 of IC25 Syscon	–	–	STOP	1. Connect frequency counter to pin 1 of IC25 and confirm that the frequency becomes 400 ± 2 kHz.
3	IC26 clock frequency	Pin 3 of IC26 Syscon	–	–	STOP	1. Connect frequency counter to pin 3 of IC26 and confirm that the frequency becomes 400 ± 2 kHz.
4	Minimum voltage	TP-1 Syscon	R22, R24 Syscon	–	STOP	1. Connect digital voltmeter or oscilloscope to TP-1 of the Syscon board. 2. Turn R22 (Minimum voltage) of the Syscon board to obtain minimum DC voltage. 3. Adjust R24 of the Syscon board to obtain DC voltage of 2.7 ± 0.05 V.
5	Still width • Perform the following steps only after completing item 4, Minimum voltage setting.  VR1 Counterclockwise REV Center STILL Clockwise FWD TP-1 2.9 ± 0.05 V 2.7 ± 0.05 V TP-2 (REV CMD) TP-3 (FWD CMD) Variable by R23	TP-2 Syscon	R23 Syscon	–	STOP	1. Connect oscilloscope to TP-2. Confirm high potential (approx. 10 V DC). If low (about 0 V DC), adjust R23 for high. 2. Connect a digital voltmeter to TP-1 and the oscilloscope to TP-2. 3. Slowly turn R22 counterclockwise and check the voltage at TP-1 and TP-2. 4. If the TP-2 voltage remains high when the TP-1 voltage exceeds 2.95 V, turn R23 slowly counterclockwise. Conversely, if the TP-2 voltage drops low before 2.85 V is attained, turn R23 slightly clockwise. 5. Turn R22 clockwise past the center click position, then turn it slowly counterclockwise. 6. Repeat the above steps 4 and 5 so that the TP-2 voltage drops from high to low when the TP-1 voltage exceeds 2.9 ± 0.05 V. 7. Change the oscilloscope connection from TP-2 to TP-3. 8. Turn R22 slowly clockwise past the center click position. 9. Confirm that the TP-3 voltage drops from high to low when the TP-1 voltage exceeds 2.9 ± 0.05 V.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
6	Maximum voltage	TP-4 or pin 7 of IC2 TP-1 Syscon	R21 Syscon 7 Pin connector 	–	STOP	1. Connect a jumper wire between pin 2 and pin 3 of the 7-pin connector on the front panel. 2. Connect a dual trace oscilloscope to TP-1 and TP-4 of the syscon board, Adjust R21 so that the voltage at TP-4 rises from low (2 V) to high (about 11 V) at the point TP-1 voltage exceeds 9.6 V ± 0.05 V when slowly turning R22.
7	Discharge voltage	TP-1 Syscon	R22 Syscon	–	STOP	1. Connect digital voltmenter or oscilloscope to TP-1 of the syscon board and adjust R22 to obtain minimum DC voltage. 2. Confirm that the TP-1 voltage becomes 2.7 ± 0.05 V.

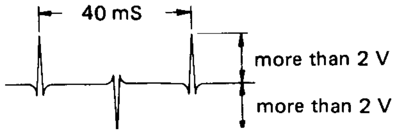
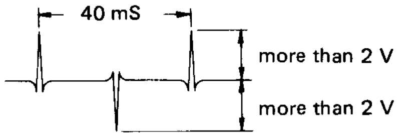
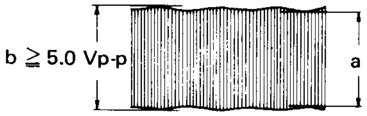
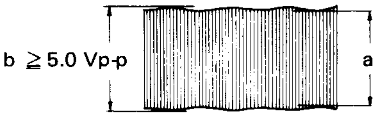
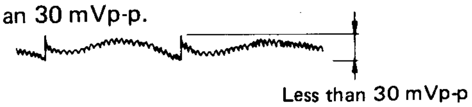
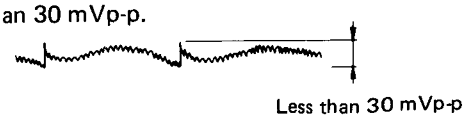
5.4 REEL SERVO CIRCUIT

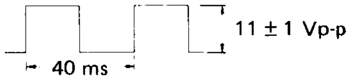
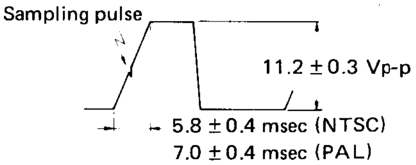
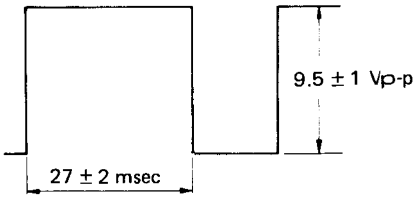
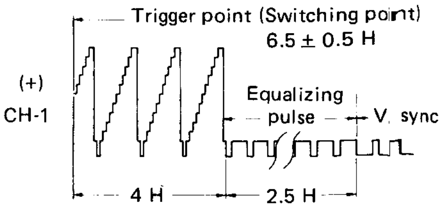
Note: Connect the ground wire of oscilloscope to the heat sink of transistor Q10 of the reel servo board.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	OSC Level	TP-3 Reel	R45 Reel	–	E-E	1. Connect oscilloscope to TP-3 of the Reel servo board. 2. Check for waveform frequency of 3 to 3.8 kHz. 3. Adjust R45 (OSC Level) of the Reel Servo board to obtain a waveform level of 3.0 Vp-p.
2	Sup. DC Set-2	TP-5 Reel	R72 Reel	–	E-E	1. Connect digital voltmeter to TP-5 of the Reel Servo board. 2. Adjust R72 (Sup. DC SET-2) of the Reel Servo board to obtain 6.0 V.
3	TU. DC Set	TP-7 Reel	R109 Reel	–	E-E	1. Connect digital voltmeter to TP-7 of the Reel Servo board. 2. Adjust R109 (TU. DC SET) of the Reel Servo board to obtain 6.0 V.
4	Sup. DC SET-3	TP-10	R170	–	PLAY	1. Connect digital voltmeter to TP-10 of the Reel servo board. 2. Cover the photo sensors with opaque material and lift the rubber rollers of the cassette housing assembly by hand. At this time push forward the raised portion of the cassette housing slide plate to lower the cassette housing and set for play mode. 3. Move the tension pole to the right end to maximize the output of the differential transformer. 4. Wait 15 to 20 seconds until the motor stops, then adjust R170 (Sup. DC set-3) of the Reel Servo board to obtain 10 mVDC.

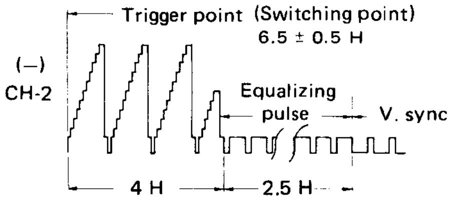
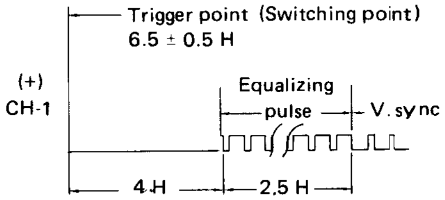
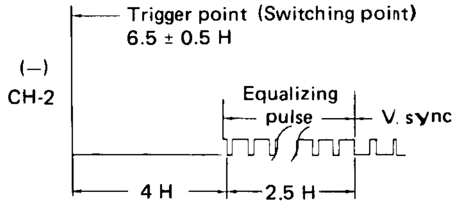
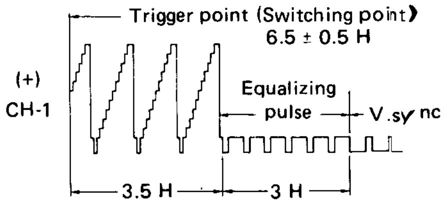
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
5	Sup. Det. Level	TP-1 Reel	R1 Reel	–	STOP P.B.	1. Connect oscilloscope to TP-1 of the Reel servo board and set for the Stop mode. 2. Adjust R1 (Supply Det. Level) of the Reel servo board to obtain voltage of 0.7 Vp-p. 3. Insert tape and set for the play mode. 4. Carefully push the Tension pole fully to the side. At this time, confirm that the input level becomes 0.05–0.1 Vp-p at TP-1 of the Reel servo board.
6	Sup. Load/ Unload Tension	TP-10 Reel	R29 Reel	–	LOADING	See 4.7.11 A.
			R32		UNLOADING	1. Connect oscilloscope to TP-10 of the Reel servo board and set for the beginning portion of 180 minute tape. 2. During the Unloading mode, adjust R32 (Supply UNL Tens.) of the Reel servo board to obtain DC voltage of 135 ± 10 mV.
7	Sup. Back Tension		R167	–	P.B.	See 4.7.11 B.
8	TU. Torque		R142	–	P.B.	See 4.7.11 C.
9	TU load/ Unload Tension	TP-9 Reel	R139 Reel		LOADING	1. Connect oscilloscope to TP-9 of the Reel servo board. 2. Set for the beginning portion of 180-minute tape, during the Loading mode, adjust R139 (T.U. LOAD/UNL Tens.) of the Reel servo board to obtain DC voltage of 40 ± 5 mV.
					UNLOADING	3. During the Unloading mode, confirm that the take-up motor voltage becomes 40 ± 10 mV DC.
10	TU. STILL Tension	TP-9 Reel	R145 Reel		STILL	1. Connect oscilloscope to TP-9 of the Reel servo board. 2. Set for the Still mode with beginning portion of 180-minute tape and adjust R145 (Still Tens.) of the Reel servo board to obtain DC voltage of 50 ± 20 mV.
11	Speed Adj.	TP-17 Reel	R128 Reel	–	F.F.	1. Connect oscilloscope to TP-17 of the Reel servo board and set for the FF mode with beginning portion of 180-minute tape. 2. Adjust R128 (FF Speed) of the Reel servo board to obtain DC voltage of 2.9–3.4 V.

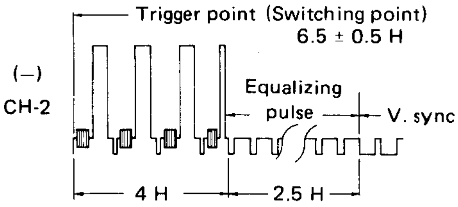
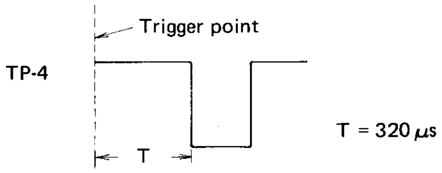
5.5 DRUM SERVO CIRCUIT

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	Drum Pulse Level	TP-13 Drum Servo	–	PAL Color Bar	PAL REC	1. Connect oscilloscope to TP-13 of the Drum servo board. 
		Player TP-13 Drum Servo	(BP-5300TR)	MH-2 Stair- Step	PAL P.B.	1. Connect oscilloscope to TP-13 of the Drum servo board. 2. Supply a video signal to SYNC IN and set the SYNC switch to EXT position. 
2	Drum FG (Frequency Generator) Level	TP-21 Drum Servo	–	PAL Color Bar	PAL REC	1. Connect oscilloscope to TP-21 of the Drum servo board. 2. Confirm that the DRUM FG level becomes more than 5 Vp-p.  b (Max. level)/a (Min. level) ≦ 1.1
		Player TP-21 Drum Servo	(BP-5300TR) –	MH-2	PAL P.B.	1. Connect oscilloscope to TP-21 of the Drum servo board. 2. Supply a video signal to SYNC IN and set the P.B. switch to EXT. 3. Confirm that the DRUM FM level becomes more than 5 Vp-p.  b (Max. level)/a (Min. level) ≦ 1.1
3	Drum AC Ripple	TP-11	–	PAL Color Bar	PAL REC	1. Connect oscilloscope to TP-11 of the Drum servo board. 2. Confirm that the DRUM AC ripple level is less than 30 mVp-p. 
		Player TP-11	(BP-5300TR) –	MH-2 Stair- Step	PAL P.B.	1. Connect oscilloscope to TP-11 of the Drum servo board. 2. Supply a video signal to SYNC IN and set the P.B. switch to EXT. 3. Confirm that the DRUM AC ripple level is less than 30 mVp-p. 

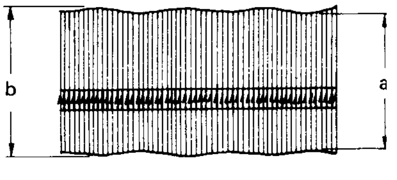
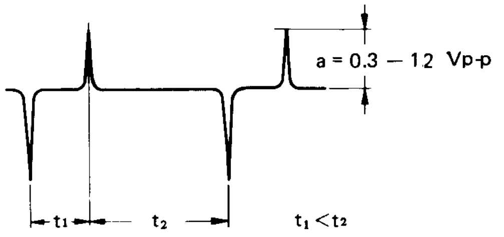
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
4	Drum discriminator	TP-17 Drum Servo	R128 (NTSC) Drum Servo R97 (PAL) Drum servo	MH-5 Stair-step MH-2 Stair-step	NTSC P.B. ↓ PAL P.B.	1. Play JVC alignment tape (MH-5). 2. Connect a digital voltmeter to TP-17 on the Drum servo board. 3. Adjust R128 to obtain a DC voltage of 5.35 V. 4. Play JVC alignment tape (MH-2). 5. Similarly, adjust R97 to obtain a DC voltage of 5.35 V.
5	Drum Flip-Flop	TP-12 Drum Servo	–	PAL Color Bar	PAL REC	1. Connect oscilloscope to TP-12 of the Drum servo board. 2. Confirm that the DRUM FLIP-FLOP level becomes 11 ± 1 Vp-p.  11 ± 1 Vp-p 40 ms
6	Drum Sampling Position	TP-15 Drum Servo	–	PAL Color Bar	PAL REC	1. Connect oscilloscope to TP-15 of the Drum servo board. 2. Confirm the waveform as shown below.  Sampling pulse 11.2 ± 0.3 Vp-p 5.8 ± 0.4 msec (NTSC) 7.0 ± 0.4 msec (PAL)
*7	Rec. CTL Delay (Pulse Width)	TP-16 Drum	–	PAL Color Bar	PAL REC	1. Connect oscilloscope to TP-16 of the Drum servo board. 2. Confirm that the REC CTL level becomes 9.5 ± 1 Vp-p and 27 ± 2 msec.  9.5 ± 1 Vp-p 27 ± 2 msec
8	P.B. Switching Point Normal Mode	Video out or TP-9 Y	R95 Drum Servo (CH-1 SW Phase)	MH-2 Stair-step	PAL P.B.	1. Connect oscilloscope to video out or TP-9 of the Y board. Trigger the oscilloscope externally (+ slope) with the signal from TP-12 of the Drum servo board. 2. Adjust R95 to position the trigger point 6.5 ± 0.5 H from V sync.  Trigger point (Switching point) 6.5 ± 0.5 H (+) CH-1 Equalizing pulse V. sync 4 H 2.5 H

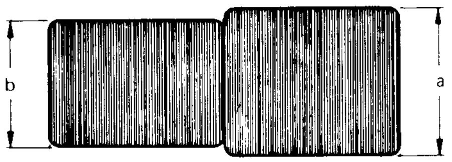
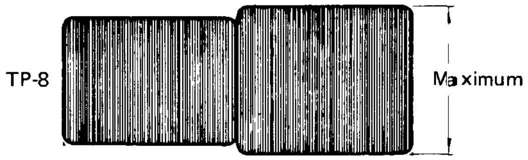
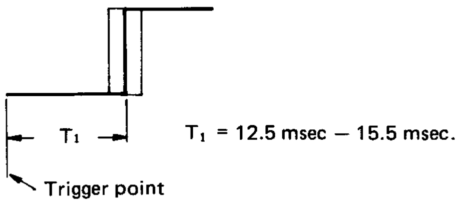
* Recorder unit only

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
			R101 Drum Servo (CH-2 SW Phase)	MH-2 Stair-step	PAL P.B.	1. Trigger the oscilloscope externally (– slope) with the signal from TP-12 of the Drum servo board. 2. Adjust R101 to position the trigger point 6.5 ± 0.5 H from V. sync.  Trigger point (Switching point) 6.5 ± 0.5 H (–) CH-2 Equalizing pulse V. sync 4 H 2.5 H
9	P.B. Switching Point Still Mode	Video out or TP-9 Y	R116 Drum Servo (CH-1 SW Phase)	MH-2 Stair-step	PAL Still	1. Connect oscilloscope to video out or TP-9 of the Y board. Trigger the oscilloscope externally (+ slope) with the signal from TP-12 of the Drum servo board. 2. Adjust R116 to position the trigger point 6.5 ± 0.5 H from V. sync.  Trigger point (Switching point) 6.5 ± 0.5 H (+) CH-1 Equalizing pulse V. sync 4 H 2.5 H
			R120 Drum Servo (CH-2 SW Phase)	MH-2 Stair-step	PAL Still	1. Trigger the oscilloscope externally (– slope) with the signal from TP-12 of the Drum servo board. 2. Adjust R120 to position the trigger point 6.5 ± 0.5 H from V. sync.  Trigger point (Switching point) 6.5 ± 0.5 H (–) CH-2 Equalizing pulse V. sync 4 H 2.5 H
10	Rec. Switching Point	TP-2 Drum Servo	R103 Drum Servo	MH-5 Stair-step	NTSC P.B.	1. Supply an NTSC color bar signal to SYNC IN and set the P.B. SYNC switch to EXT. 2. Connect oscilloscope to TP-2 of the Drum servo board. 3. Trigger the oscilloscope externally (+ slope) with the signal from TP-12 of the Drum servo board. 4. Adjust R103 to position the trigger point 6.5 ± 0.5 H from V. sync.  Trigger point (Switching point) 6.5 ± 0.5 H (+) CH-1 Equalizing pulse V. sync 3.5 H 3 H

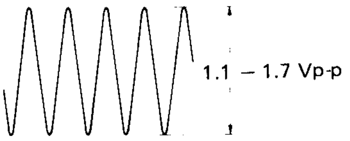
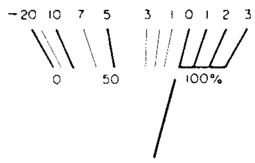
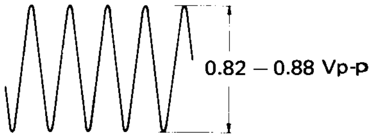
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
*		TP-2 Drum Servo	R91 (Rec. SW Phase)	PAL Color Bar	PAL REC	1. Supply a PAL color bar signal to video in. Trigger the oscilloscope externally (– slope) with the signal from TP-12 of the Drum servo board. 2. Connect oscilloscope to TP-2 of the Drum servo board. 3. Adjust R91 to position the trigger point 6.5 ± 0.5 H from V. sync.  Trigger point (Switching point) 6.5 ± 0.5 H (–) CH-2 Equalizing pulse V. sync 4 H 2.5 H
11	V. Pulse Position	TP-4 Drum Servo	R27 Drum Servo	PAL Color Bar	PAL REC ↓ P.B. STILL	1. Supply the color bar signal as input, record and play back. 2. Trigger the oscilloscope with the signal from TP-12 of the Drum servo board and set the sync. slope to minus (–). 3. Connect the oscilloscope to TP-4 and adjust R27 so that the fall portion of V. pulse signal becomes 320 μs from the trigger point as shown below.  Trigger point TP-4 T = 320 μs T

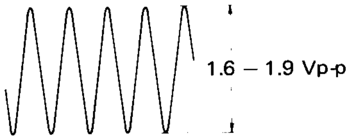
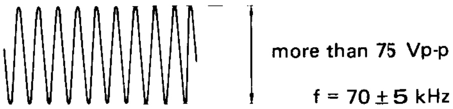
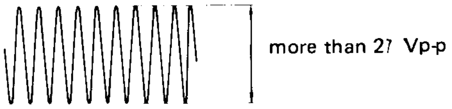
5.6 CAPSTAN SERVO CIRCUIT

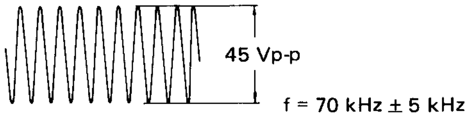
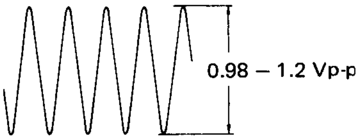
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	CTL Amp. DC SET-2	TP-5 Capstan Servo	R40 Capstan Servo	–	STOP	1. Connect a digital voltmeter to TP-5 of the Capstan servo board. 2. Adjust R40 to obtain a DC voltage of 6.0 ± 0.1 V.
2	FG (Frequency Generator) Amp. DC SET-1	TP-1 Capstan Servo	R3 Capstan Servo	–	STOP	1. Connect a digital voltmeter to TP-1 of the Capstan servo board. 2. Adjust R3 to obtain a DC voltage of 5.1 V ± 0.1 V.
3	Still Width (DC SET-4)	TP-7 Capstan Servo	R62 Capstan Servo	–	STOP	1. Connect a digital voltmeter to TP-7 of the Capstan servo board. 2. Adjust R62 to obtain a DC voltage of 3.000 V ± 0.005 V.
4	Capstan Discriminator (DC SET-3)	TP-13 Capstan Servo	R106 Capstan Servo	PAL Color Bar	PAL REC	1. Connect a digital voltmeter to TP-13 of the Capstan servo board. 2. Adjust R106 to obtain a DC voltage of 5.10 V.
		Player TP-13 Capstan Servo	(BP-5300TR) R106 Capstan Servo	MH-2 Color Bar	PAL P.B.	1. Connect a digital voltmeter to TP-13 of the Capstan servo board. 2. Supply a video signal to SYNC IN and set the P.B. SYNC switch to EXT. 3. Adjust R106 to obtain a DC voltage of 5.10 V.
5	Capstan FG (Frequency Generator)	TP-1 Capstan Servo	–	PAL Color Bar	PAL REC	1. Connect oscilloscope to TP-1 of the Capstan servo board. 2. Confirm that the capstan FG level fluctuation becomes less than 1.45 between a and b.  b (Max. level)/a (Min. level) ≦ 1.45
6	P.B. CTL Level	TP-6 Capstan Servo	–	MH-2 Stair-step	PAL P.B.	1. Connect oscilloscope to TP-6 of the Capstan servo board. 2. Confirm that the P.B. CTL level becomes 0.3–1.2 Vp-p and $t_1 < t_2$. 

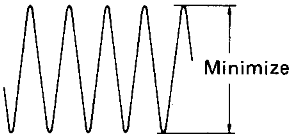
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
7	Sub. Tracking Adj.	TP-8 PRE/REC	R112 Capstan Servo	PAL Color Bar	PAL REC ↓ P.B.	1. Connect oscilloscope to TP-8 of the Pre/Rec board. 2. Trigger the oscilloscope externally with signal from TP-12 of the Drum servo board. 3. Set tracking control to the center click position. 4. Adjust R112 for maximum FM level. 
8	Drum Search	TP-21 Drum Servo	R18 Capstan Servo	–	PAL FRD ↓ STILL	1. Turn R22 fully counter clokwise from parts mounted side of the circuit board. 2. Connect a frequency counter to TP-21 of the Drum servo board. 3. During forward, set for the Still mode. 4. Adjust R18 to obtain a frequency of 1593 Hz.
		TP-21 Drum Servo	R22 Capstan Servo	–	REV ↓ STILL	1. Connect a frequency counter to TP-21 of the Drum servo board. 2. During reverse, set for the Still mode. 3. Adjust R22 to obtain a frequency of 1590 Hz.
9	Pre-rec. Tracking	TP-8 Pre/Rec.	R171 Capstan Servo	PAL Color Bar	PAL REC ↓ P.B.	1. Prepare a 12 kΩ carbon resistor. 2. Connect the 12 kΩ resistor between TP-28 and TP-21 on the Capstan servo board. 3. Connect the oscilloscope to TP-8 on the Pre/Rec board. 4. Adjust R171 for maximum FM level. 
10*	Capstan Rec. Phase 	TP-12 Capstan	R90 Capstan	PAL Color Bar	PAL REC ↓ PAUSE ↓ REC	1. Connect oscilloscope to TP-12 of the Capstan board. 2. Trigger the oscilloscope externally (– slope) with signal from TP-12 of the Drum servo board. 3. During recording, set for the Pause mode then, press the PLAY button. 4. When the unit switches from playback to recording, check the fluctuation of the waveform. 5. If the fluctuation is out of the range between 12.5 ms and 15.5 ms, adjust R90 (CAP Rec Phase), then repeat steps 3 to 5.

5.7 AUDIO CIRCUIT

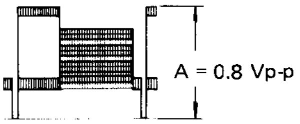
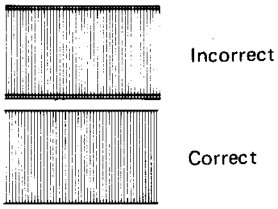
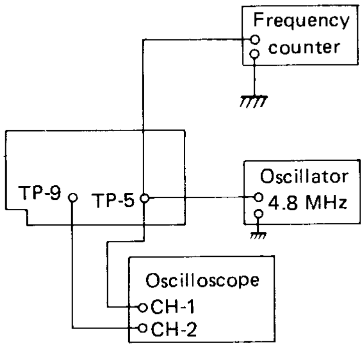
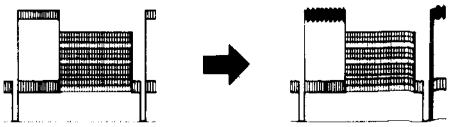
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1*	E-E Level	Audio Out or TP-10 CH-1 TP-11 CH-2 Audio	Rec. Level Control	400 Hz -30dBs (0.07 Vp-p) to Audio IN	E-E	1. Supply a 400 Hz –30 dB audio input signal to Audio IN and set the audio input level switch to –20 dB. 2. Set the NR switch and Limiter switch to OFF. 3. Without load, turn the Rec level controls fully clockwise. 4. Confirm that the audio output level becomes –4 ± 2 dBs (1.1 V – 1.7 Vp-p).  Confirm a difference between CH-1 and CH-2 of within 2 dB.
2*	Level Meter	Level Meter	R201 CH-1 R202 CH-2 Audio	400 Hz -20dBs (0.22 Vp-p) to Audio IN	E-E	1. Supply a 400 Hz –20 dBs audio input signal to Audio IN and set the audio output level switch to –20 dB. 2. Connect oscilloscope to Audio Out (TP-10 CH-1, TP-11 CH-2). 3. Without load, adjust the Rec. level controls of the front panel to obtain –6 dBs (1.1 Vp-p). 4. Adjust R201 (CH-1 Meter) and R202 (CH-2 Meter) of the Audio Amp board to obtain 0 dB indications on the level meters. 
3*	Limiter Operation	Audio Out or TP-10 CH-1 TP-11 CH-2 Audio	–	400 Hz -10dBs (0.7 Vp-p) to Audio IN	E-E	1. Supply a 400 Hz –10 dBs audio input signal to Audio IN and set limiter switches to ON. 2. Set the Audio Input level switch to –20 dB and the NR switch to OFF. 3. Confirm that the audio output levels with no load are –2.5 dB. 4. Set Limiter switches to OFF. 5. Confirm that the audio output levels with no load are 4 dB, and difference between CH-1 and CH-2 is within 1 dB.
4	Playback Level	Audio Out or TP-10 CH-1 TP-11 CH-2 Audio	R30 CH-1 R100 CH-2 Audio	MH-2 1 kHz	PAL P.B.	1. Set the NR switch to OFF. 2. At 1 kHz 0 dB playback, adjust R30 (CH-1 P.B. LEVEL) and R100 (CH-2 P.B. LEVEL) to obtain audio output levels with no load of –8 dB ± 0.5 dB (0.82 V – 0.88 Vp-p). 

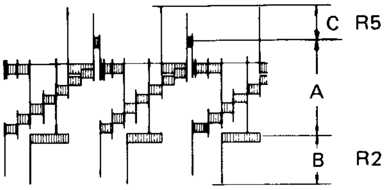
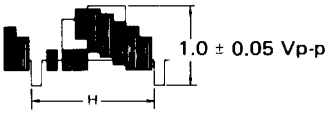
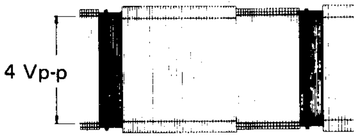
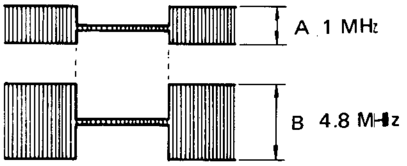
<table>
<tr><th>No.</th><th>Item</th><th>Check Point</th><th>Adjustment Parts</th><th>Signal</th><th>Mode</th><th>Description and Waveform</th></tr>
<tr><td>5</td><td>Audio Monitor Level</td><td>Monitor Out or TP-12
Audio</td><td>–</td><td>MH-2
1 kHz</td><td>PAL
P.B.</td><td>1. Set the NR switch to OFF.
2. Set the Audio monitor switch to Audio-1 (CH-1) and without load, check for –2 dB ± 1.0 dB (1.6 V – 1.9 Vp-p) Audio output level.

3. In the same manner, check Audio-2 (CH-2) and pin 1 of the TV connector.</td></tr>
<tr><td>6*</td><td>Full Erase</td><td>TP-7
Audio</td><td>–</td><td>–</td><td>PAL
REC</td><td>1. Connect oscilloscope to TP-7 of the Audio board.
2. Check for oscillator frequency of 70 kHz ± 5 kHz and output level of more than 75 Vp-p.
 </td></tr>
<tr><td>7*</td><td>Audio Erase</td><td>TP-8
TP-9
Audio</td><td>–</td><td>–</td><td>PAL
REC</td><td>1. Connect a dual trace oscilloscope to TP-8 and TP-9 of the Audio board.
2. Check for output level of more than 27 Vp-p.
 </td></tr>
<tr><td>8</td><td>P.B. Frequency Response</td><td>Monitor Out or TP-12
Audio</td><td>R28 CH-1
R97 CH-2
Audio</td><td>MH-6</td><td>NTSC
P.B.</td><td>1. Play JVC alignment tape.
2. Set the NR switch to OFF.
3. Set the Monitor switch to CH-1 and CH-2.
4. Adjust R28 (CH-1) and R97 (CH-2) of the Audio board to obtain the frequency response shown in the Table.
5. Set the 400 Hz signal for 0 dB reference level.
<table><tr><th>Frequency</th><th>Level (dB)</th></tr><tr><td>400 Hz</td><td>0 dB</td></tr><tr><td>100 Hz</td><td>+1 ~ –2 dB</td></tr><tr><td>10 kHz</td><td>+1.5 ~ –2.5 dB</td></tr></table>6. If 10 kHz is insufficient, readjust R28 and R97.</td></tr>
</table>

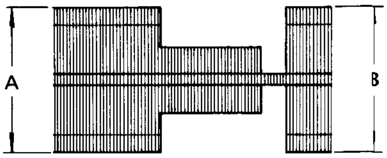
<table>
<tr><th>No.</th><th>Item</th><th>Check Point</th><th>Adjustment Parts</th><th>Signal</th><th>Mode</th><th>Description and Waveform</th></tr>
<tr><td>9*</td><td>Bias Level</td><td>TP-3 CH-1
TP-6 CH-2
Audio</td><td>R57 CH-1
R126 CH-2
Audio</td><td>–
–</td><td>PAL
REC</td><td>1. Connect a dual trace oscilloscope to TP-3 and TP-6 of the Audio board.
2. Adjust R57 (CH-1 BIAS LEVEL) and R126 (CH-2 BIAS LEVEL) of the Audio board to set the bias levels for 45 Vp-p.

 </td></tr>
<tr><td>10</td><td>P.B. Noise Reduction</td><td>Audio Out
or
TP-10
CH-1
TP-11
CH-2
Audio</td><td>–</td><td>MH-6
10 kHz</td><td>P.B.</td><td>1. Play JVC alignment tape.
2. Set the Audio Input level switch to –20 dB.
3. Connect oscilloscope to Audio Out.
4. Without load, confirm that the output level becomes –7 ± 1.5 dB between Audio NR switch OFF and Audio NR switch ON.</td></tr>
<tr><td>11*</td><td>Audio Rec. Level</td><td>Audio Out
or
TP-10
CH-1
TP-11
CH-2
Audio</td><td>R48 CH-1
R118 CH-2
Audio</td><td>1 kHz
-20dBs
(0.22 Vp-p)
to
Audio IN</td><td>PAL
REC
⬇
P.B.</td><td>1. Supply a 1 kHz –20 dBs audio input signal to Audio IN and set the NR switch to OFF.
2. Without load, during the recording mode adjust R48 (CH-1 Recording Level) and R118 (CH-2 Recording Level) of the Audio board so that the audio output level during playback becomes –6 ± 1 dB (0.98–1.2 Vp-p).

 </td></tr>
<tr><td>12*</td><td>Rec./P.B. Frequency Response</td><td>Audio Out
or
TP-10
CH-1
TP-11
CH-2
Audio</td><td>R53 CH-1
R123 CH-2
Audio</td><td>400 Hz,
40 Hz,
12 kHz
-40dBs
(0.022 Vp-p)
to
Audio IN</td><td>PAL
REC
⬇
P.B.</td><td>1. Supply audio input signal of 400 Hz, 40 Hz and 12 kHz at –40 dBs to Audio IN.
2. Without load, set the NR switch to OFF and the audio input level switch to –20 dB.
3. Adjust R53 (CH-1) and R123 (CH-2) of the Audio board to obtain the frequency response shown in the Table.
4. Set the 400 Hz signal for 0 dB reference level.
<table>
<tr><th>Frequency</th><th>Level (dB)</th></tr>
<tr><td>400 Hz</td><td>0 dB</td></tr>
<tr><td>40 Hz</td><td>–1 ~ –5 dB</td></tr>
<tr><td>12 kHz</td><td>0 ~ –4 dB</td></tr>
</table>
5. If 12 kHz is insufficient, readjust R53 and R123.</td></tr>
</table>

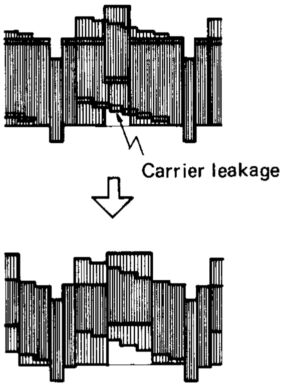
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
13*	Crosstalk Cancel	Audio Out or TP-10 CH-1 TP-11 CH-2 Audio	R70 CH-1 R139 CH-2 Audio	3 kHz -20dBs (0.22 Vp-p) to Audio IN	CH-1 DUB ⬇ PAUSE	1. Supply 3 kHz -20 dBs audio input signal to Audio IN (CH-1) and set the A-DUB switch to CH-1. 2. Connect oscilloscope to Audio Out (TP-11) of the Audio board. 3. Adjust R139 (CH-2 Crosstalk Cancel) of the Audio board for minimum CH-2 level. 
					CH-2 DUB ⬇ PAUSE	1. Supply 3 kHz -20 dBs audio input signal to Audio IN (CH-2) and set the A-DUB switch to CH-2. 2. Connect oscilloscope to Audio Out (TP-10). 3. Adjust R70 (CH-1 Crosstalk Cancel) of tne Audio board for minimum CH-1 level.

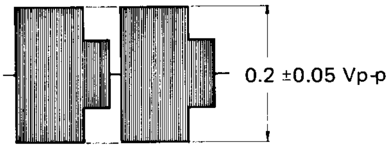
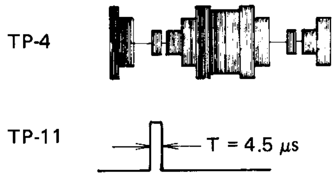
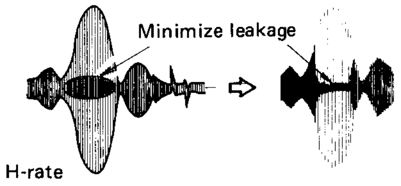
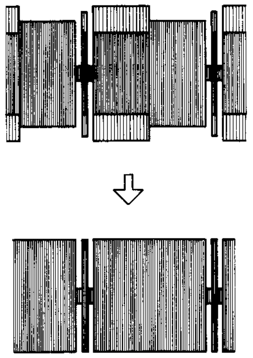
5.8 VIDEO CIRCUIT

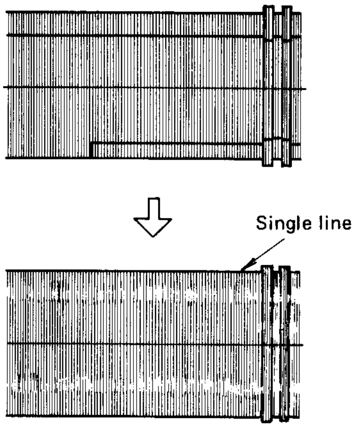
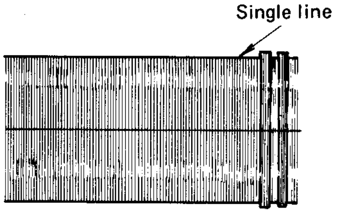
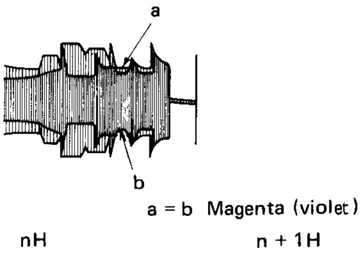
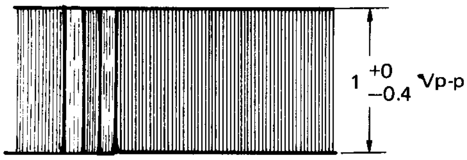
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1*	AGC	TP-3 Y	R22 Y	PAL Color Bar	E-E	1. Supply a color bar signal to VIDEO IN. 2. Connect oscilloscope to TP-3 of Y board. 3. Adjust R22 (AGC Level Set) of Y board to obtain 0.8 Vp-p. 
2*	Carrier Bal.	Pin 9 of IC-1 Y	R9 Y	No Signal	E-E	1. Disconnect video input signal and connect both CH-1 and CH-2 inputs of a dual trace oscilloscope to pin 9 of IC1 on the Y board. 2. Invert one channel (CH-2) and set oscilloscope to the ALT mode. Adjust the vertical gain of the oscilloscope to obtain the same level for CH-1 and CH-2, and set the oscilloscope to GND and adjust the vertical position of the oscilloscope of CH-1 and CH-2 until the two lines become single line. 3. Set the oscilloscope to AC and adjust R9 (Carrier Bal.) of the Y board so that the double line of the top and bottom become single line as shown in the Figure. 
3*	Carrier and Deviation	TP-5 Y  Frequency counter TP-9 TP-5 Oscillator 4.8 MHz Oscilloscope CH-1 CH-2 **Note:** Before adjustment, turn R5 (Dark Clip) and R2 (White Clip) fully clockwise so that the signal is not limited.	C6 R31 PAL R37 SECAM Y	–	E-E	1. Disconnect video input signal and set for the E-E mode. 2. Connect a frequency counter to TP-5 of the Y board. 3. Adjust C6 (Carrier Set) of the Y board for 3.8 MHz. 4. Supply a PAL color bar input signal to VIDEO IN. 5. Set generator for 4.8 MHz and connect it to TP-5 of the Y board. 6. Connect a dual trace oscilloscope to TP-5 of the Y board for CH-1 and TP-7 of the Y board for CH-2. 7. Set the oscilloscope to ADD mode and adjust the vertical gain of the oscilloscope and signal generator output to easily observe beat. 8. Adjust R31 (PAL Deviation) of the Y board to set the deviation as shown in the Figure. 9. Supply a SECAM color bar input signal to VIDEO IN. 10. Adjust R37 (SECAM Deviation) of the Y board to set the deviation as shown in the Figure. 

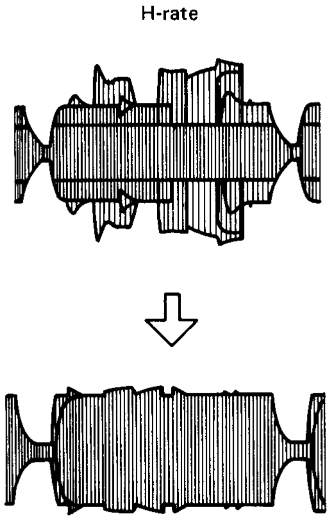
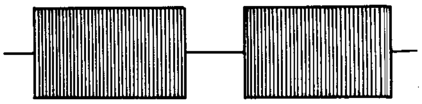
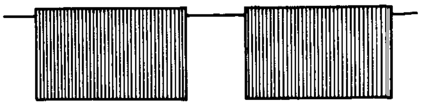
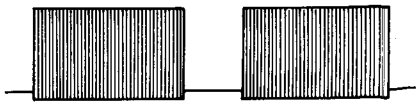
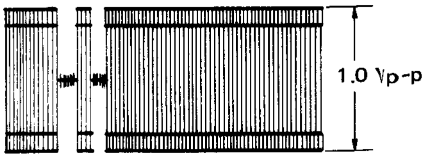
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
4*	White and Dark Clip	TP-1 Y	R2 R5 Y	PAL Color Bar	E-E	1. Supply a PAL color input signal to VIDEO IN. 2. Connect oscilloscope to TP-1 of the Y board. 3. As shown in the Figure adjust R2 (White Clip) and R5 (Dark Clip).  A : B : C = 4 : 3.4 ± 0.2 : 2.0 ± 0.2
5*	E-E Y Level	Video Out or TP-9 Y	R91 Y	PAL Color Bar	E-E	1. Supply a PAL color input signal to VIDEO IN. 2. With load at 75 Ω, connect oscilloscope to VIDEO OUT (TP-9) of the Y board. 3. Adjust R91 (E-E Y Level) of the Y board for 1.0 ± 0.05 Vp-p. 
6*	REC FM Level	TP-1 Pre/Rec	R1 Pre/Rec	PAL Color Bar	PAL REC	1. Supply a color input signal to VIDEO IN. 2. Connect oscilloscope to TP-1 of the Pre/Rec board and trigger the oscilloscope externally with the signal from TP-12 of the Drum servo board. 3. Adjust R3 (REC FM Level) to obtain 4 Vp-p. 
7	Video Heads Resonance and Q (Quality Factor) (Using signal generator)	TP-8 Pre/Rec	R34 CH-1(Q) C14 CH-1(Fo) TP-2 R24 CH-2(Q) C19 CH-2(Fo) TP-3	Signal Generator 1 MHz and 4.8 MHz	PAL P.B.	Note: This adjustment is required only after replacing the upper drum assembly. 1. Connect the oscilloscope to TP-8 on the Pre/Rec board. 2. Trigger the oscilloscope externally with the signal from TP-12 of the Drum servo board. 3. Set for play mode with a blank cassette tape.  CH-1 Resonance and Q 1. Supply 1 MHz signal to TP-2 of the Pre/Rec board and adjust signal generator level so that amplitude of the signal A becomes 0.2 Vp-p as shown in the Figure. 2. Set generator for 4.8 MHz. 3. Adjust C14 (CH-1 Resonance) for maximum signal amplitude.

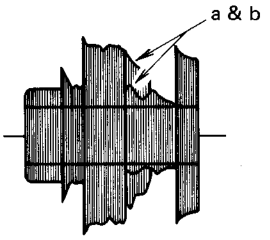
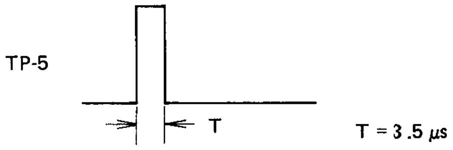
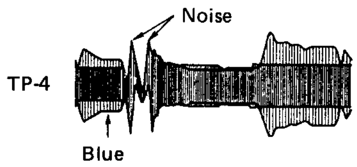
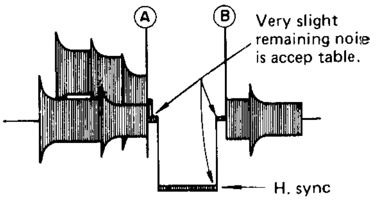
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
						4. Adjust R34 (CH-1 Q) so that amplitude of the signal B is 4 times (12 dB) that of the 1 MHz signal as shown in the Figure.
						CH-2 Resonance and Q 1. Similarly, perform adjustment for CH-2. Supply 1 MHz signal to TP-3 of the Pre/Rec board and adjust Resonance with C19 and CH-2 Q with R24.
			C16 CH-1(Fo) TP-2 C20 CH-2(Fo) TP-3	Signal Generator 1 MHz and 4.5 MHz	NTSC P.B.	Note: Set for NTSC mode. 1. Perform adjustment in the same manner as PAL normal P.B. Adjust C16 to set the CH-1 resonance point to 4.5 MHz and C20 to set the CH-2 resonance point to 4.5 MHz.
		TP-9 Pre/Rec	R92 CH-1(Q) C68 CH-1(Fo) TP-12 R82 CH-2(Q) C72 CH-2(Fo) TP-13	Signal Generator 1 MHz and 4.8 MHz	PAL STILL	Note: Set for PAL STILL mode. 1. Perform adjustment in the same manner as PAL normal P.B.
			C70 CH-1(Fo) TP-12 C74 CH-2(Fo) TP-13	1 MHz and 4.5 MHz	NTSC STILL	Note: Set for NTSC STILL mode. 1. Perform adjustment in the same manner as NTSC normal P.B.
8	P.B. Color Channel Balance Level	TP-16 Pre/Rec	R28 R106 Pre/Rec	MH-2 Color Bar	PAL P.B.	1. Play JVC alignment tape. 2. Connect oscilloscope to TP-16 of the Pre/Rec board. 3. Trigger the oscilloscope externally with the signal from TP-12 of the Drum servo board. 4. Adjust R28 (NOR. Color Balance) of the Pre/Rec board to align the CH-1 and CH-2 levels.  A = B = 0.5 Vp-p 5. Adjust R106 (P.B. Level) of the Pre/Rec board for a waveform level of 0.5 Vp-p.
			R87 Pre/Rec	MH-2 Color Bar	PAL STILL	1. In the same manner as above and set for the Still mode with bar noise in the least visible position on a monitor. 2. Adjust R87 (SEA. Color Balance) of the Pre/Rec board to align the CH-1 and CH-2 levels.

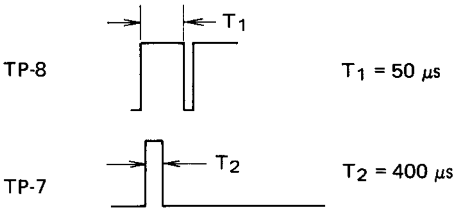
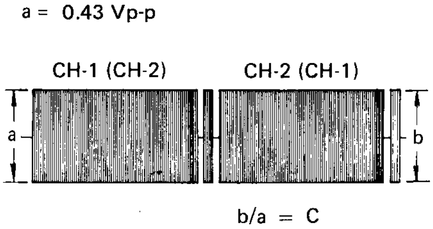
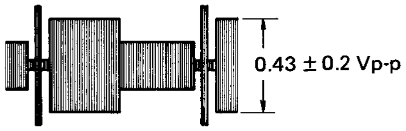
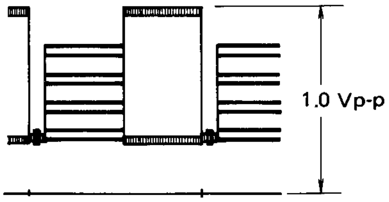
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
9	Limiter Balance	TP-7 Y	R97 Y	PAL Color Bar	PAL REC ↓ P.B.	1. Supply a color bar input signal to VIDEO IN, record and play back. 2. Connect oscilloscope to TP-7 of the Y board. 3. Trigger the oscilloscope externally with the signal from TP-12 of the Drum servo board. 4. Adjust R97 (Limiter Bal.) to minimize carrier leakage at TP-7. 
10	AFC	TP-15 P & N	R92 P & N	– MH-2	PAL P.B. PAL P.B.	1. Set for PAL PLAY mode with a blank cassette tape. 2. Connect a DC voltmeter to TP-15 of P & N board. 3. Measure the DC potential of TP-15 and make a note of this as voltage "A". 4. Play MH-2 alignment tape (color bar signal). 5. Adjust R92 for "A" voltage of TP-15.
		TP-16 P & N	R135 P & N	– MH-5	NTSC P.B. NTSC P.B.	Note: Set for NTSC mode. 1. Perform adjustment in the same manner as PAL mode.
11	P.B. 4.43 MHz (SUB CARR. OSC.)	TP-6 P & N	C54 P & N	–	PAL P.B.	1. Set for PAL PLAY mode with a blank cassette tape. 2. Connect a frequency counter to TP-6 on the P & N color board. 3. Adjust C54 of P & N color board for 4.433619 ± 20 Hz.
12	VXO	TP-9 P & N TV monitor	C78 P & N	MH-2 Color Bar	PAL P.B.	1. Connect the DC voltmeter to TP-9 on the P & N color board. 2. Play back the alignment tape to reproduce the color bar segment. 3. Turn C78 clockwise slowly from minimum voltage at TP-9, read the DC voltage (B_1) volts at the point normal/color picture appears on TV monitor. 4. Turn C78 counterclockwise slowly from maximum voltage at TP-9, read the DC voltage (B_2) volts at the point normal color picture appears on TV monitor. 5. Adjust C78 for $\frac{B_1 + B_2}{2}$ volts at TP-9.

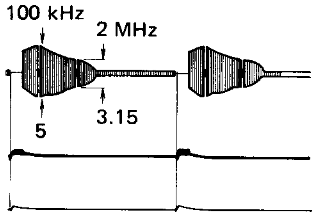
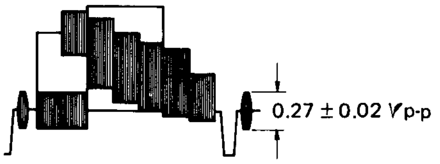
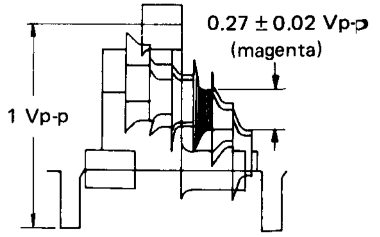
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
13	P.B. Color IN Level	TP-2 P & N	R143 P & N	MH-2 Color Bar	PAL P.B.	1. Play JVC alignment tape (MH-2). 2. Connect the oscilloscope to TP-2 on P & N color board. 3. Adjust R143 for 0.2 ± 0.05 Vp-p at TP-2. 
14	Burst Sep. Pulse	TP-4 TP-11 P & N	L20 L18 P & N	MH-2 Color Bar	PAL P.B.	1. Connect CH-1 of oscilloscope to TP-4 and CH-2 to TP-11 on the P & N color board. Select the CHOP mode. 2. Play JVC alignment tape (MH-2). 3. Adjust the core of L20 so that the pulse width of the burst separation pulse is 4.5 μs. 4. Adjust the core of L18 so that the timing of the burst separation pulse is the same position with the burst center. 
15	Crosstalk Cancel	TP-4 P & N	R53 P & N	MHVE-3 Color Sweep	PAL P.B.	1. Connect the oscilloscope to TP-4 on the P & N board. 2. Play JVC alignment tape (MH-2). 3. Adjust R53 for minimum leakage at TP-4. 
16	P.B. Input Filter	TP-11 SECAM	L12 SECAM	MH-5 Color Bar	SECAM P.B.	1. Play JVC alignment tape (MH-5). 2. Connect the oscilloscope to TP-11 on the SECAM color board. 3. Adjust L12 for a flat waveform as shown below. 

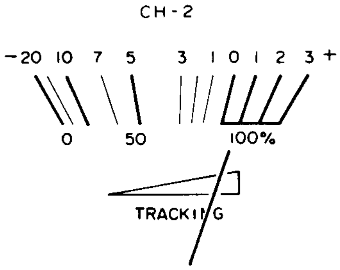
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
17	Balance-1	TP-12 SECAM	R75 R78 SECAM	MH-5 Color Bar	SECAM P.B.	1. Play JVC alignment tape (MH-5). 2. Connect the oscilloscope to TP-12 on the SECAM color board. 3. Adjust R75 and R78 for minimum spurious output as shown below. 
18	Balance-2	TP-13 SECAM	R91 SECAM	MH-5 Color Bar	SECAM P.B.	1. Play JVC alignment tape (MH-5). 2. Connect the oscilloscope to TP-13. 3. Adjust R91 for minimum spurious output as shown below. 
19	P.B. Output Filter	TP-15 SECAM	BB3 SECAM	MH-5 Color Bar	SECAM P.B.	1. Play JVC alignment tape (MH-5). 2. Connect the oscilloscope to TP-15. 3. Adjust the core of BB3 so that amplitude (a) and (b) of waveforms are equal to each other. 
20	P.B. Color Killer	TP-16 SECAM	R103 SECAM	MH-5 Color Bar	SECAM P.B.	1. Play JVC alignment tape (MH-5). 2. Connect the oscilloscope to TP-16. 3. Adjust R103 for $1^{+0}_{-0.4}$ Vp-p. 

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
21*	Rec. Input Filter	TP-1 SECAM	BB1 SECAM	SECAM Color Bar	SECAM E-E	1. Supply the color bar signal as input. 2. Connect the oscilloscope to TP-1. 3. Adjust the core of BB1 for minimum amplitude difference between (a) and (b) at TP-1. 
22*	Rec. Limiter Balance	TP-2 SECAM	R13 SECAM	SECAM Color Bar	SECAM E-E	1. Supply the color bar signal as input. 2. Connect the oscilloscope to TP-2. 3. Adjust R13 to center the level of the no signal component in the color signal H blanking period with respect to the color signal.  Correct  Incorrect  Incorrect
23*	Rec. Color Killer	TP-16 SECAM	R17 SECAM	SECAM Color Bar	SECAM E-E	1. Supply the color bar signal as input. 2. Connect the oscilloscope to TP-16. 3. Adjust R17 for 1.0 Vp-p. 

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
24*	Rec. Output Filter	TP-4 SECAM	BB2 SECAM	SECAM Color Bar	SECAM E-E	1. Supply the color bar signal as input. 2. Connect the oscilloscope to TP-4. 3. Adjust the core of BB2 so that amplitudes (a) and (b) of waveforms are equal to each other.  a = b Violet (magenta) The same violet (magenta) level in 2H period.
25*	H Noise Gate Pulse (Recorder)	TP-5 TP-4 SECAM	R32 R36 SECAM	SECAM Color Bar	SECAM E-E	1. Supply the color bar signal as input. 2. Connect CH-1 of oscilloscope to TP-5 and CH-2 to TP-4. 3. Adjust R32 for T = 3.5 μs at TP-5. 4. Adjust R36 so that the rise portion of the noise is zero to the fall portion of blue signal at TP-4.  Noise level is less than signal. 
	(Player)	TP-9 Y	R32 R36	MH-5 SECAM Color Bar	SECAM P.B.	1. Play the JVC alignment tape MH-5 to reproduce color bar segment. 2. Connect the oscilloscope to TP-9 on the Y board. 3. Adjust R36 to obtain noise gate position at Ⓐ.  Ⓐ Ⓑ Very slight remaining noise is acceptable. H. sync 4. Adjust R32 to vary the noise gate pulse width and obtain position Ⓑ. 5. Perform the above adjustment so that residual noise is absent from H. sync and color signal is not gated.

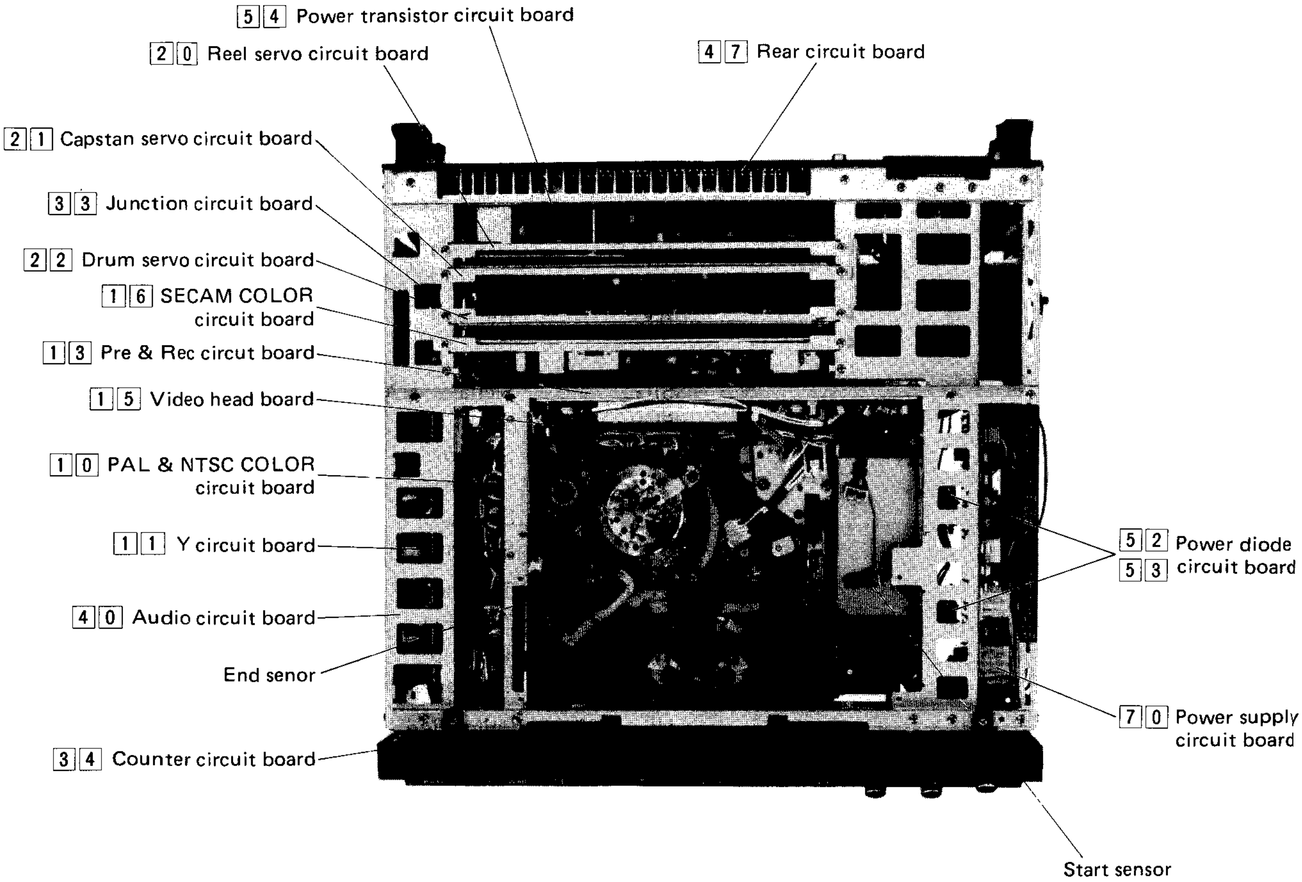
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
26	V. Noise Gate Pulse	TP-8 TP-7 SECAM	R45 R41 SECAM	SECAM Color Bar	SECAM E-E	1. Supply a color bar signal as input. 2. Connect the oscilloscope to TP-8. 3. Adjust R45 for T_1 = 50 µs at TP-8. 4. Change the probe from TP-8 to TP-7, adjust R41 for T_2 = 400 µs at TP-9.  T_1 TP-8 T_1 = 50 µs T_2 TP-7 T_2 = 400 µs
27*	Rec. Color Level and Balance	TP-16 Pre/Rec	R15 R2 Pre/Rec	PAL Color Bar	PAL REC ↓ P.B.	1. Supply a color bar signal as input. 2. Set for recording mode, then playback. 3. Connect the oscilloscope to TP-16. 4. During recording, adjust R15 so that during playback; $20 \log \frac{b}{a} \leq 1$ dB. 5. Similarly, adjust R2 during recording so that during playback ; b = 0.43 ± 0.02 Vp-p.  a = 0.43 Vp-p CH-1 (CH-2) CH-2 (CH-1) a b b/a = C
		TP-16 Pre/Rec	R1 Pre/Rec	SECAM Color Bar	SECAM REC ↓ P.B.	1. Supply the SECAM color bar signal as input. 2. Similarly, adjust R1 in the PAL Recording mode so that the waveform level becomes 0.43 Vp-p. 
28	P.B. Y Level	Video Out or TP-9 Y	R68 Y	MH-2 Color Bar	PAL P.B. B/W	1. Play JVC alignment tape (MH-2). 2. Connect the oscilloscope to VIDEO OUT connector with 75 ohm termination. 3. Adjust R68 so that video level becomes 1.0 Vp-p. 
			R62 Y	MH-5 SECAM Color Bar	SECAM P.B. B/W	1. Play JVC alignment tape to reproduce the SECAM color bar segment. 2. Similarly adjust R62 so that video level becomes 1.0 Vp-p.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
29	P.B. Frequency Response and Channel Balance	Video Out or TP-9 Y	R34 CH-1 R24 CH-2 R44 Pre/Rec	PAL Color Sweep	PAL REC ↓ P.B.	1. Supply the color sweep signal as input, recording, then playback. 2. Connect oscilloscope to TP-9 or VIDEO OUT connector with 75 ohm termination. 3. Trigger the oscilloscope externally (– slope CH-1, + slope CH-2) with the signal from TP-12 of Drum servo board. 4. If the 2 MHz levels are not equal, align the larger channel to smaller with either R34 or R24. 5. Use the controls of the oscilloscope to position the 100 kHz region at scale graduation 5 of oscilloscope screen. Adjust R44 to position the 2 MHz portion at 3.15 (–4 dB) of the oscilloscope graduations. 
			R92 CH-1 Q R82 CH-2 Q	PAL Color Sweep	PAL REC ↓ P.B. STILL	6. Perform the above steps 1 to 3. 7. Set for the STILL mode with bar noise in the least visible position on a TV monitor. 8. Perform the above step 4 by using R92 and R82.
			R51 Pre/Rec	MH-6	NTSC P.B.	1. Play JVC alignment tape (MH-6). 2. Similarly, adjust R51 so that the 2 MHz level becomes 3.15/5 of the 100 kHz level.
30	P.B. Color Level	Video Out or TP-9 Y	R85 Y	PAL Color Bar	PAL REC ↓ P.B.	1. Supply a color bar signal as input, record and playback. 2. Connect the oscilloscope to TP-9 or VIDEO OUT connector with 75 ohm termination. 3. Adjust R85 for 0.27 Vp-p of burst signal. 
			R83 Y	SECAM Color Bar	SECAM REC ↓ P.B.	1. Supply a color bar signal, record and playback. 2. Similarly, adjust R83 to obtain a violet (magenta) level of 0.2 Vp-p. 

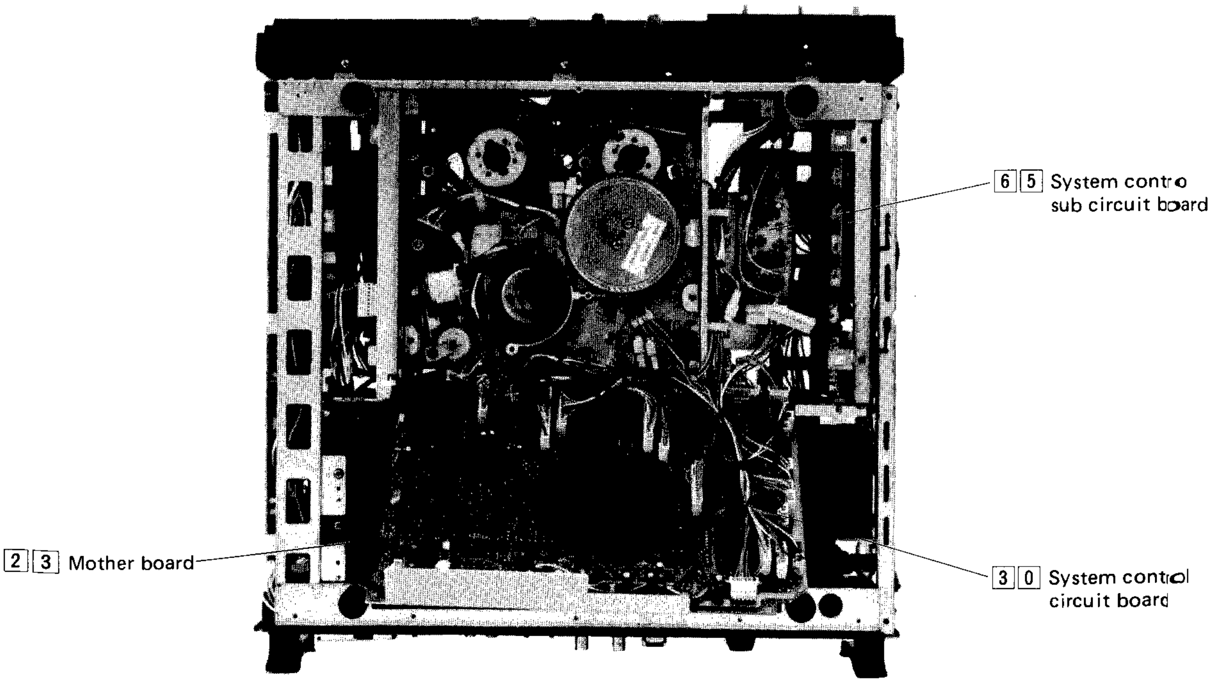
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
31	Tracking Meter	On the Meter	R117 Pre/Rec	PAL Color Bar	PAL REC ↓ P.B.	1. Supply a color bar input signal to VIDEO IN, record, then playback. 2. Pull the tracking control knob and set it at the center click position. 3. Adjust R117 of the Pre/Rec board for +1 dB on the CH-2 level meter. 

SECTION 6
CHARTS AND DIAGRAMS

6.1 ELECTRICAL PARTS LOCATION



54 Power transistor circuit board
20 Reel servo circuit board
47 Rear circuit board
21 Capstan servo circuit board
33 Junction circuit board
22 Drum servo circuit board
16 SECAM COLOR circuit board
13 Pre & Rec circut board
15 Video head board
10 PAL & NTSC COLOR circuit board
11 Y circuit board
40 Audio circuit board
End senor
34 Counter circuit board
52 Power diode
53 circuit board
70 Power supply circuit board
Start sensor



65 System control sub circuit board
23 Mother board
30 System control circuit board

6.2 KEY TO ABBREVIATIONS

ACC : Automatic Color Control
ALC : Automatic Level Control
AUD : Audio
ADD : Adder
AFC : Automatic Frequency Control
AGC : Automatic Gain Control
AL : After Loading
AMP : Amplifier
ASSEM : Assembly

BAL : Balance
BPF : Band-Pass Filter
BRK : Brake
B/W : Black and White

CAP : Capstan
COL : Color
CMD : Command
CAS : Cassette
CH : Channel
CONV : Converter
COUNT : Counter
CTL : Control

DET : Detector
DEMOD : Demodulator
D-FF : D-Flip-Flop
DFRS : Drum Free Run Stop
DUB : Dubbing
DEV : Deviation
DIF TRANS: Differential Transformer
DISCRI : Discriminator
DL : Delay Line
DOC : Drop Out Compensator

EMPHA : Emphasis
EE : Electric to Electric
E : Erase, Edit
EF : Emitter Follower
EQ : Equalizer

FE : Full Erase
FG : Frequency Generator
FWD : Forward

GEN : Generator

HG : Hall Element
HP : High-Pass Filter
H TRAP : Horizontal Trap

ID : Identical
INT : Interrupt
INS : Insert

LIM : Limiter
LOAD : Loading
LP : Low-Pass
LPF : Low-Pass Filter
LT : Loading Tension

MOD : Modulator
MON : Monitor
MOT : Motor

NOR : Normal

OP : Operation
OSC : Oscillator

P.B. : Playback
PREV : Preview

REC : Record
RPT : Repeat
REV : Reverse
R/P : Record/Playback
RT : Rotary Transformer
RY : Relay

S : Search
SIG : Signal
SUP. : Supply
SOL : Solenoid
SW : Switch
SEP : Separator
SYSCON : System Control

TEN : Tension
TR : Tracking
TU : Take-up
TC : Tension Compensate

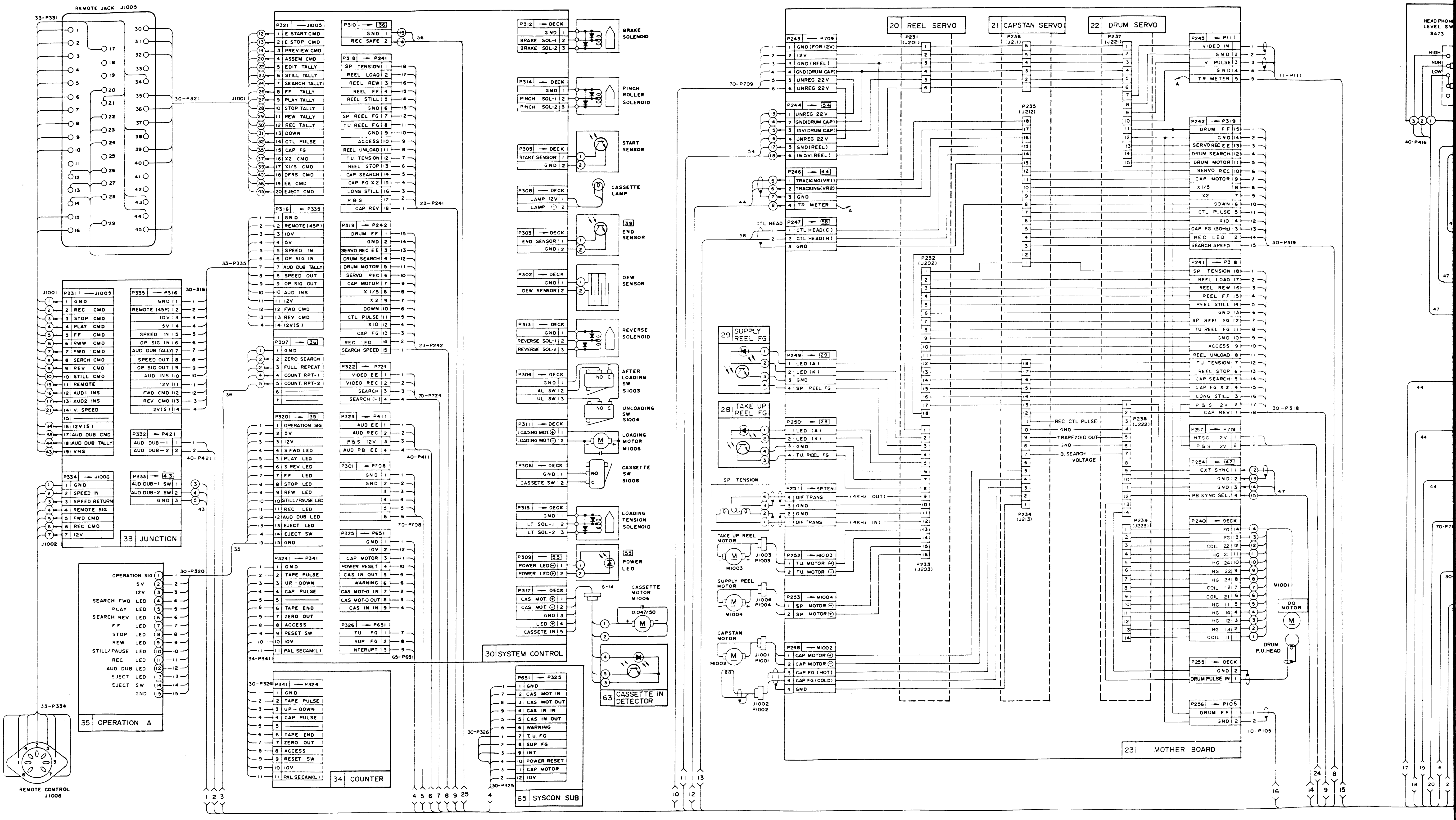
UL : Unloading

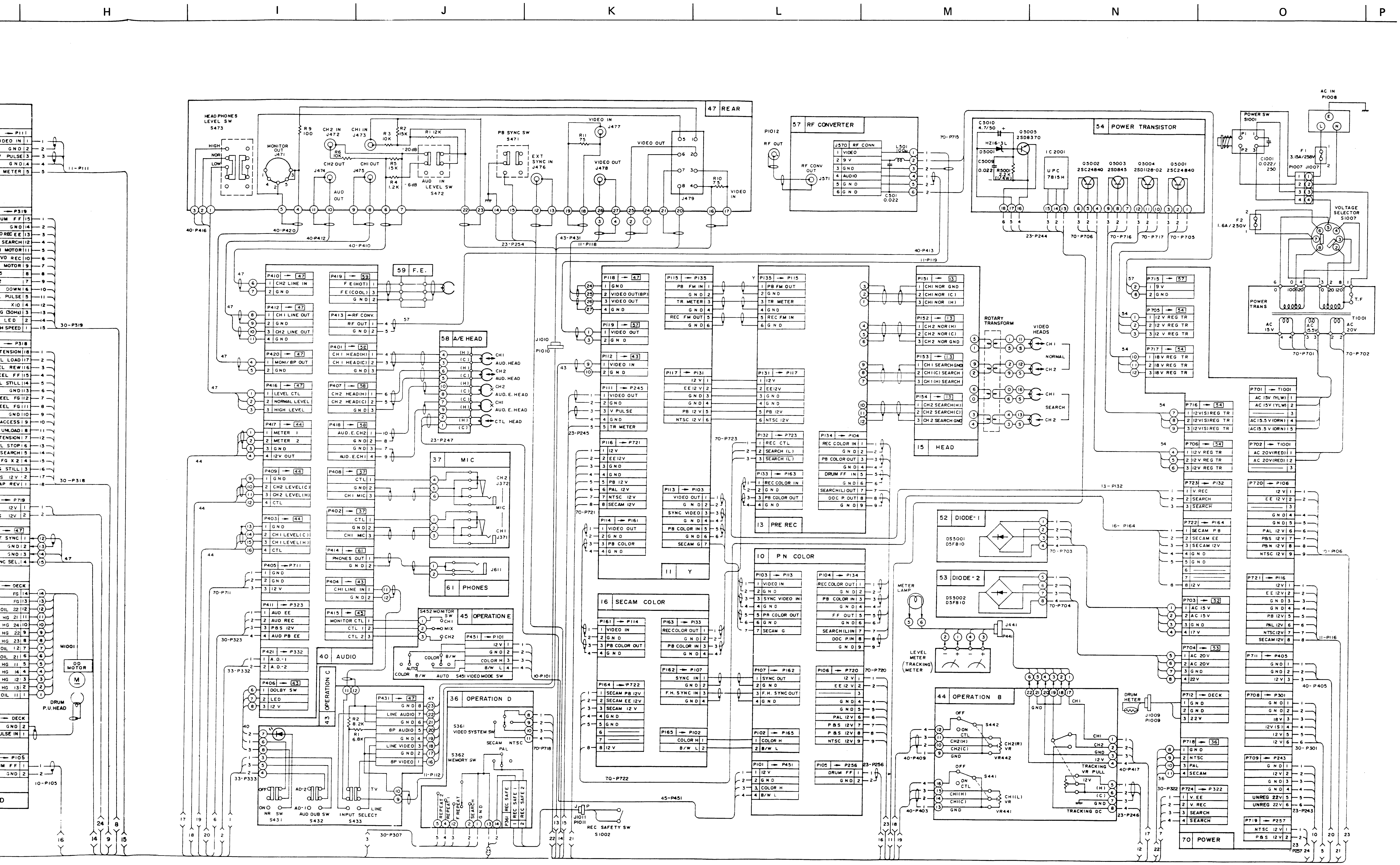
VCO : Voltage Control Oscillator
V : Video, Vertical
VXO : Variable Crystal Oscillator

Y : Luminance

for instance:
AUD. PB. EE : Audio Playback E-E
TU. TC : Take-up Tension Compensate
AUD. E : Audio Erase

6.3 OVERALL WIRING : BR-6400TR

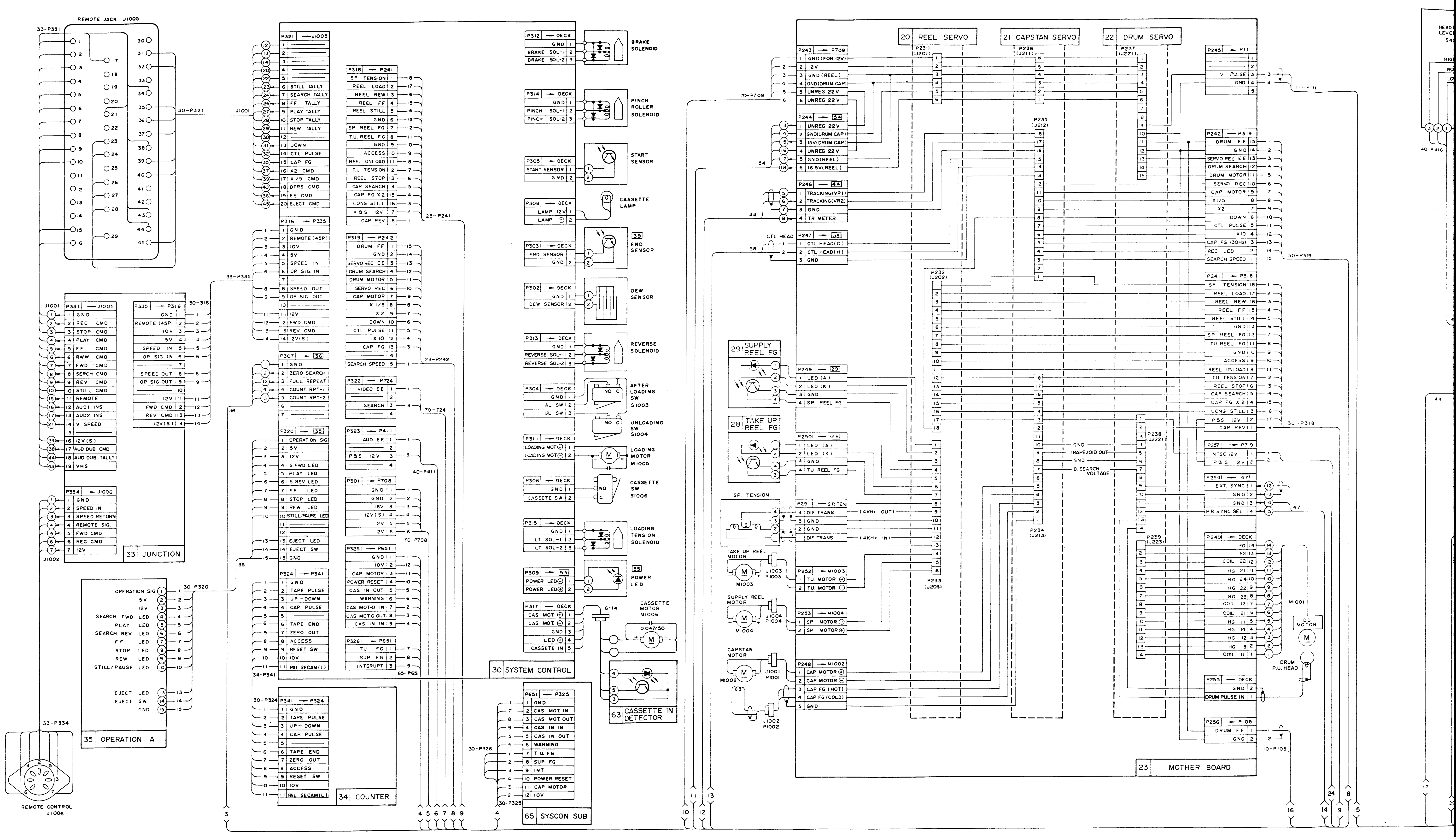

REMOTE JACK J1005
33-P331
30-P321
J1001
33-P335
30-316
J1002
33 JUNCTION
35 OPERATION A
30-P320
33-P334
REMOTE CONTROL J1006
30 SYSTEM CONTROL
34 COUNTER
65 SYSCON SUB
23-P241
23-P242
70-P724
40-P411
70-P708
65-P651
34-P341
30-P324
30-P326
30-P325
BRAKE SOLENOID
PINCH ROLLER SOLENOID
START SENSOR
CASSETTE LAMP
END SENSOR
DEW SENSOR
REVERSE SOLENOID
AFTER LOADING SW S1003
UNLOADING SW S1004
LOADING MOTOR M1005
CASSETTE SW S1006
LOADING TENSION SOLENOID
POWER LED
CASSETTE MOTOR M1006
63 CASSETTE IN DETECTOR
20 REEL SERVO
21 CAPSTAN SERVO
22 DRUM SERVO
23 MOTHER BOARD
29 SUPPLY REEL FG
28 TAKE UP REEL FG
SP TENSION
TAKE UP REEL MOTOR M1003
SUPPLY REEL MOTOR M1004
CAPSTAN MOTOR M1002
70-P709
11-P111
30-P319
30-P318
10-P105
40-P416
DD MOTOR M1001
DRUM P.U.HEAD
HEAD PHONE LEVEL SW S473
HIGH
NOR
LOW

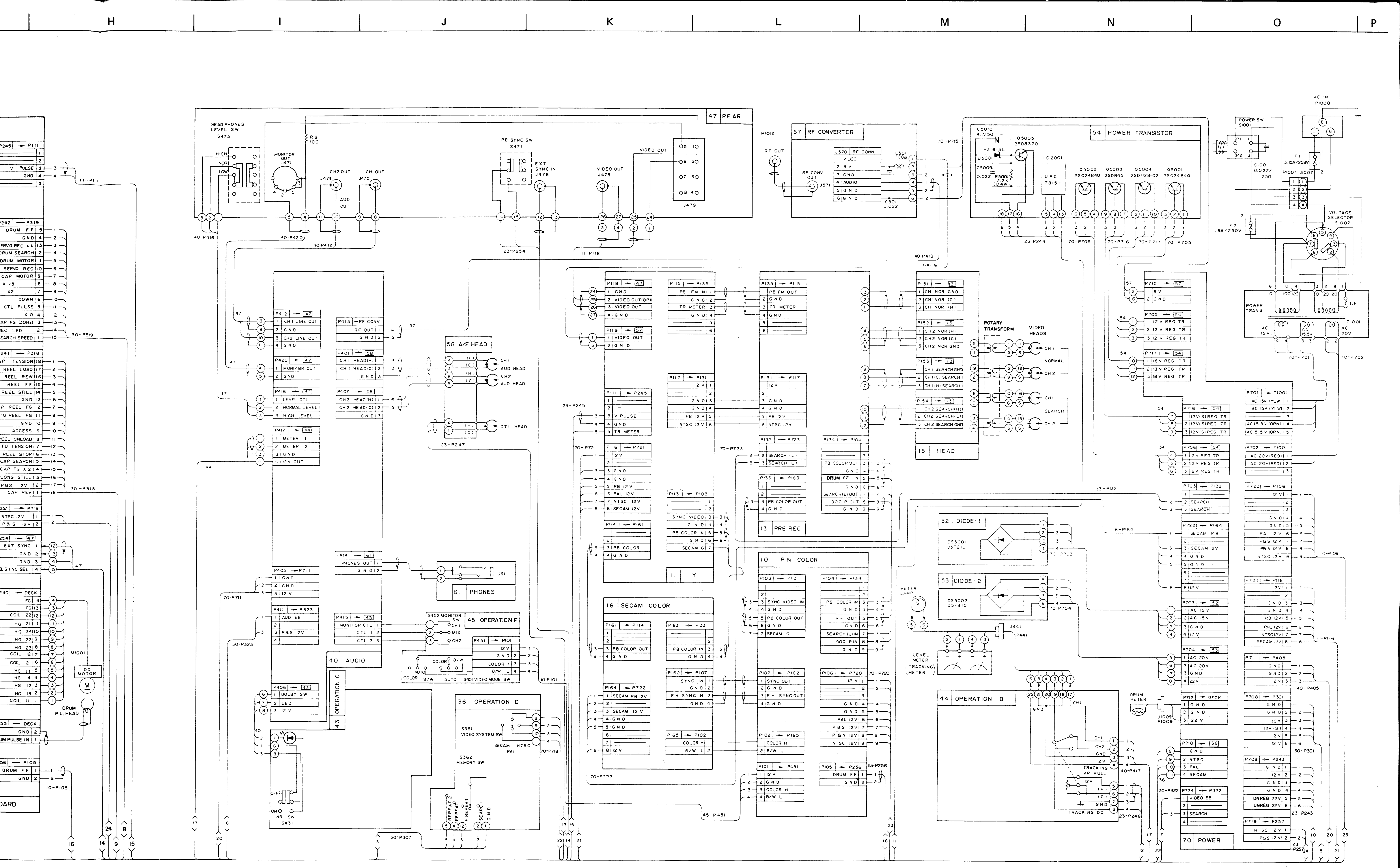

H
I
J
K
L
M
N
O
P
47 REAR
HEAD PHONES LEVEL SW S473
MONITOR OUT J471
CH2 IN J472
CH1 IN J473
CH2 OUT J474
CH1 OUT J475
AUD IN LEVEL SW S472
PB SYNC SW S471
EXT SYNC IN J476
VIDEO IN J477
VIDEO OUT J478
VIDEO OUT
VIDEO IN
J479
57 RF CONVERTER
RF OUT P1012
RF CONV OUT J371
54 POWER TRANSISTOR
IC 2001 UPC 7815H
Q5005 2SD8370
Q5002 2SC2484O
Q5003 2SD845
Q5004 2SD1128-02
Q5001 2SC2484O
POWER SW S1001
AC IN P1008
F1 3.15A/250V
F2 1.6A/250V
VOLTAGE SELECTOR S1007
POWER TRANS
T1001
59 F.E.
58 A/E HEAD
37 MIC
61 PHONES
45 OPERATION E
40 AUDIO
43 OPERATION C
36 OPERATION D
S361 VIDEO SYSTEM SW
S362 MEMORY SW
S451 VIDEO MODE SW
S452 MONITOR SW
NR SW S431
AUD DUB SW S432
INPUT SELECT S433
REC SAFETY SW S1002
11 Y
16 SECAM COLOR
10 PN COLOR
13 PRE REC
15 HEAD
ROTARY TRANSFORM
VIDEO HEADS
52 DIODE-1
53 DIODE-2
DS5001 DSFB10
DS5002 DSFB10
METER LAMP
LEVEL METER (TRACKING METER)
44 OPERATION B
S442
S441
VR442
VR441
TRACKING VR PULL
TRACKING DC
DRUM HETER
J1009 P1009
70 POWER
M1001 DD MOTOR
DRUM P.U.HEAD

OVERALL WIRING : BR-6400TR
(OVERALL WIRING : BP-5300TR)

OVERALL WIRING : BR-6400TR
(OVERALL WIRING : BP-5300TR)

6.4 OVERALL WIRING : BP-5300TR


A
B
C
D
E
F
G
H
1
2
3
4
5
6
REMOTE JACK J1005
33-P331
30-P321
J1001
P321 — J1005
P318 — P241
P316 — P335
P319 — P242
P307 — 36
P322 — P724
P320 — 35
P323 — P411
P301 — P708
P325 — P651
P324 — P341
P326 — P651
P341 — P324
P331 — J1005
P335 — P316
P334 — J1006
33 JUNCTION
35 OPERATION A
34 COUNTER
30 SYSTEM CONTROL
65 SYSCON SUB
P651 — P325
63 CASSETTE IN DETECTOR
REMOTE CONTROL J1006
33-P334
33-P335
30-P316
30-P320
23-P241
23-P242
70-724
40-P411
70-P708
65-P651
34-P341
30-P324
30-P326
30-P325
P312 — DECK
BRAKE SOLENOID
P314 — DECK
PINCH ROLLER SOLENOID
P305 — DECK
START SENSOR
P308 — DECK
CASSETTE LAMP
P303 — DECK
END SENSOR
P302 — DECK
DEW SENSOR
P313 — DECK
REVERSE SOLENOID
P304 — DECK
AFTER LOADING SW S1003
UNLOADING SW S1004
P311 — DECK
LOADING MOTOR M1005
P306 — DECK
CASSETTE SW S1006
P315 — DECK
LOADING TENSION SOLENOID
P309 — 55
POWER LED
P317 — DECK
CASSETTE MOTOR M1006
0.047/50
20 REEL SERVO
21 CAPSTAN SERVO
22 DRUM SERVO
P243 — P709
P244 — 54
P246 — 44
P247 — 28
CTL HEAD
29 SUPPLY REEL FG
P249 — 29
28 TAKE UP REEL FG
P250 — 28
SP. TENSION
P251 — SP TEN
TAKE UP REEL MOTOR M1003
J1003 P1003
P252 — M1003
SUPPLY REEL MOTOR M1004
J1004 P1004
P253 — M1004
CAPSTAN MOTOR M1002
J1001 P1001
J1002 P1002
P248 — M1002
P231 (J201)
P236 (J211)
P237 (J221)
P235 (J212)
P232 (J202)
P233 (J203)
P234 (J213)
P238 (J222)
P239 (J223)
TRAPEZOID OUT
D. SEARCH VOLTAGE
P245 — P111
P242 — P319
P241 — P318
P257 — P719
P254 — 47
P240 — DECK
M1001 DD MOTOR
DRUM P.U. HEAD
P255 — DECK
P256 — P105
23 MOTHER BOARD
70-P709
11-P111
30-P319
30-P318
10-P105
40-P416
HEAD LEVEL

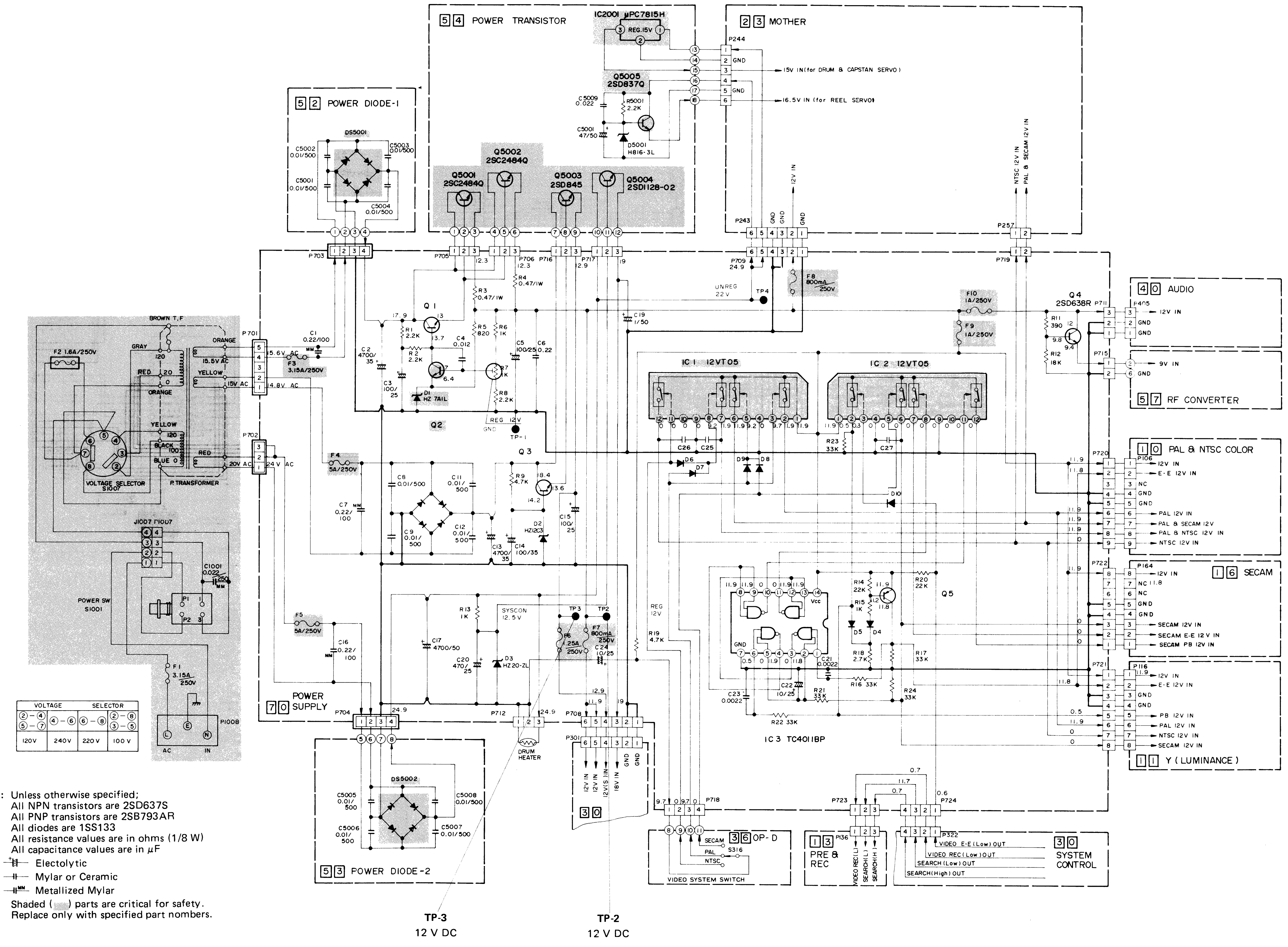

H
I
J
K
L
M
N
O
P
47 REAR
HEAD PHONES LEVEL SW S473
MONITOR OUT J471
CH2 OUT J474
CH1 OUT J475
AUD OUT
PB SYNC SW S471
EXT SYNC IN J476
VIDEO OUT J478
VIDEO OUT J479
57 RF CONVERTER
RF OUT P1012
RF CONV OUT J571
54 POWER TRANSISTOR
IC 2001 UPC 7815H
AC IN P1008
POWER SW S1001
VOLTAGE SELECTOR S1007
POWER TRANS
58 A/E HEAD
CH1 AUD HEAD
CH2 AUD HEAD
CTL HEAD
61 PHONES
45 OPERATION E
S452 MONITOR SW
S451 VIDEO MODE SW
40 AUDIO
43 OPERATION C
36 OPERATION D
S361 VIDEO SYSTEM SW
S362 MEMORY SW
S431 NR SW
11 Y
16 SECAM COLOR
13 PRE REC
10 P N COLOR
15 HEAD
ROTARY TRANSFORM
VIDEO HEADS
52 DIODE-1
53 DIODE-2
METER LAMP
LEVEL METER TRACKING METER
44 OPERATION B
TRACKING VR PULL
TRACKING DC
DRUM METER
70 POWER
M1001 DD MOTOR
DRUM P.U. HEAD

OVERALL WIRING : BP-5300TR
(OVERALL WIRING : BR-6400TR) 6-4

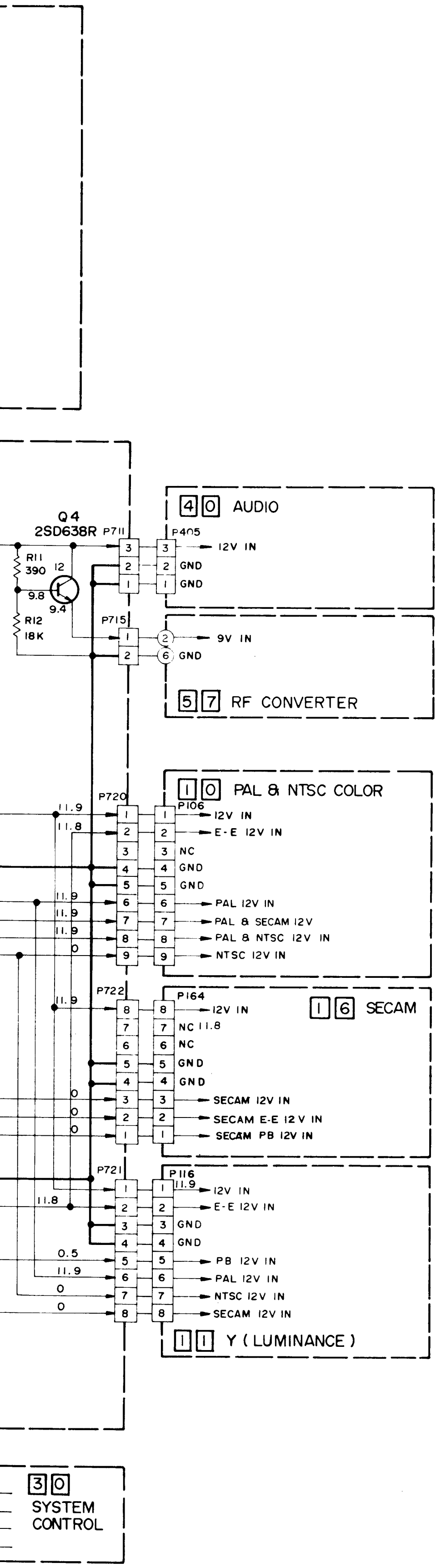
6-4 **OVERALL WIRING : BP-5300TR**
(OVERALL WIRING : BR-6400TR)

6.5 POWER SUPPLY SCHEMATIC DIAGRAM

6.6 POWER

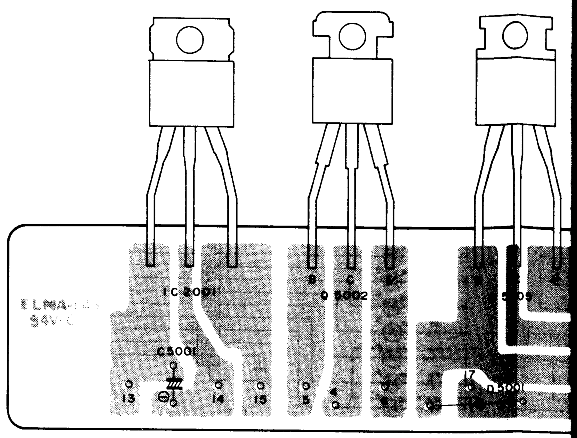

A
B
C
D
E
F
G
H
1
2
3
4
5
6
5 4 POWER TRANSISTOR
IC2001 μPC7815H
REG.15V
2 3 MOTHER
P244
GND
15V IN (for DRUM & CAPSTAN SERVO)
16.5V IN (for REEL SERVO)
Q5005 2SD837Q
C5009 0.022
R5001 2.2K
C5001 47/50
D5001 H816-3L
5 2 POWER DIODE-1
DS5001
C5002 0.01/500
C5003 0.01/500
C5001 0.01/500
C5004 0.01/500
Q5001 2SC2484Q
Q5002 2SC2484Q
Q5003 2SD845
Q5004 2SD1128-02
P243
12V IN
NTSC 12V IN
PAL & SECAM 12V IN
P257
P703
P705
P706
P716
P717
P709
P719
UNREG 22V
TP4
F8 800mA 250V
F10 1A/250V
F9 1A/250V
Q4 2SD638R
P711
R11 390
R12 18K
4 0 AUDIO
P405
12V IN
GND
P715
9V IN
5 7 RF CONVERTER
BROWN T.F
GRAY
ORANGE
RED
YELLOW
BLACK
BLUE
F2 1.6A/250V
15.5V AC
15V AC
P701
C1 0.22/100
F3 3.15A/250V
4.8V AC
VOLTAGE SELECTOR S1007
P.TRANSFORMER
P702
20V AC
24V AC
J1007 P1007
C1001 0.022 250
POWER SW S1001
F1 3.15A 250V
P1008
AC IN
Q1
R1 2.2K
R2 2.2K
C2 4700/35
C3 100/25
C4 0.012
D1 HZ 7AIL
Q2
R3 0.47/1W
R4 0.47/1W
R5 820
R6 1K
R7 1K
R8 2.2K
C5 100/25
C6 0.22
REG 12V
GND
TP-1
Q3
R9 4.7K
C19 1/50
IC1 12VT05
IC2 12VT05
R23 33K
C26
C25
C27
D6
D7
D9
D8
D10
1 0 PAL & NTSC COLOR
P720
P106
12V IN
E-E 12V IN
NC
GND
PAL 12V IN
PAL & SECAM 12V
PAL & NTSC 12V IN
NTSC 12V IN
F4 5A/250V
C7 0.22/100
C8 0.01/500
C11 0.01/500
C9 0.01/500
C12 0.01/500
C13 4700/35
C14 100/35
D2 HZ12C3
C15 100/25
P722
P164
1 6 SECAM
SECAM 12V IN
SECAM E-E 12V IN
SECAM PB 12V IN
R14 22K
R15 1K
R20 22K
Q5
D5
D4
R18 2.7K
R17 33K
R19 4.7K
REG 12V
C21 0.0022
C22 10/25
C23 0.0022
R21 33K
R16 33K
R24 33K
R22 33K
IC3 TC4011BP
Vcc
GND
P721
P116
PB 12V IN
PAL 12V IN
NTSC 12V IN
SECAM 12V IN
1 1 Y (LUMINANCE)
F5 5A/250V
C16 0.22/100
C17 4700/50
R13 1K
SYSCON 12.5V
C20 470/25
D3 HZ20-ZL
TP3
TP2
F6 1.25A 250V
F7 800mA 250V
C24 10/25
POWER SUPPLY 7 0
P704
P712
DRUM HEATER
P708
P301
12V IN
12V IN
12V(S.)IN
18V IN
GND
GND
3 0
5 3 POWER DIODE-2
DS5002
C5005 0.01/500
C5006 0.01/500
C5008 0.01/500
C5007 0.01/500
P718
3 6 OP-D
SECAM
PAL
NTSC
S316
VIDEO SYSTEM SWITCH
P723
P724
P136
1 3 PRE & REC
VIDEO REC(L)
SEARCH(L)
SEARCH(H)
P322
VIDEO E-E (Low) OUT
VIDEO REC (Low) OUT
SEARCH (Low) OUT
SEARCH (High) OUT
3 0 SYSTEM CONTROL
VOLTAGE SELECTOR
②-④ ⑤-⑦ 120V
④-⑥ 240V
⑥-⑧ 220V
②-⑧ ③-⑤ 100V
TP-3 12 V DC
TP-2 12 V DC

NOTE: Unless otherwise specified;
All NPN transistors are 2SD637S
All PNP transistors are 2SB793AR
All diodes are 1SS133
All resistance values are in ohms (1/8 W)
All capacitance values are in μF
Electolytic
Mylar or Ceramic
Metallized Mylar
Shaded ( ) parts are critical for safety.
Replace only with specified part nombers.

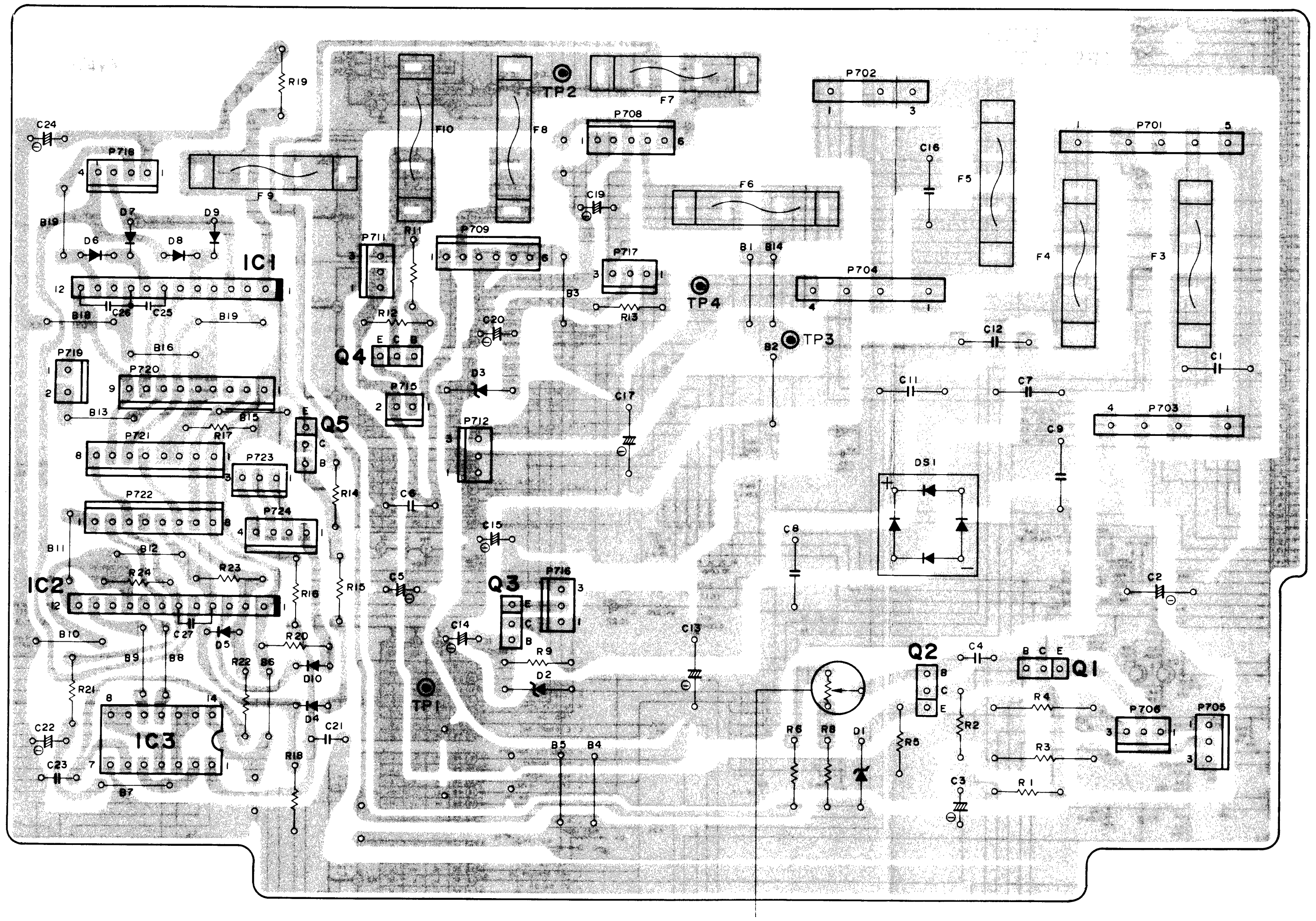

Q4
2SD638R
R11
390
R12
18K
9.8
9.4
12
P711
P715
P720
P722
P721
4 0 AUDIO
P405
12V IN
GND
GND
9V IN
GND
5 7 RF CONVERTER
1 0 PAL & NTSC COLOR
P106
12V IN
E-E 12V IN
NC
GND
GND
PAL 12V IN
PAL & SECAM 12V
PAL & NTSC 12V IN
NTSC 12V IN
11.9
11.8
P164
12V IN
NC 11.8
NC
GND
GND
SECAM 12V IN
SECAM E-E 12V IN
SECAM PB 12V IN
1 6 SECAM
P116
11.9
12V IN
E-E 12V IN
GND
GND
PB 12V IN
PAL 12V IN
NTSC 12V IN
SECAM 12V IN
0.5
1 1 Y (LUMINANCE)
3 0 SYSTEM CONTROL

6.6 POWER SUPPLY, TRANSISTER AND DIODE CIRCUIT BOARD (PWB)

– POWER TRANSISTOR BOARD –

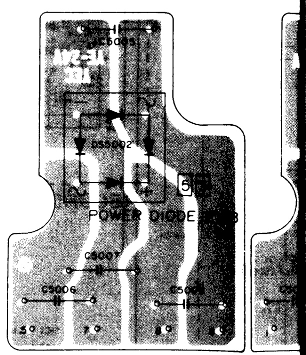

IC 2001
Q 5002
C5001
13
14
15
17

– POWER SUPPLY BOARD –


TP2
TP4
TP3
TP1
IC1
IC2
IC3
Q1
Q2
Q3
Q4
Q5
F3
F4
F5
F6
F7
F8
F9
F10
P701
P702
P703
P704
P705
P706
P708
P709
P711
P712
P715
P716
P717
P718
P719
P720
P721
P722
P723
P724
DS1
R19
C24
B19
B18
B16
B13
B15
B11
B12
B10
B9
B8
B7
B6
B5
B4
B3
B2
B1
B14
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
C1
C2
C3
C4
C5
C6
C7
C8
C9
C11
C12
C13
C14
C15
C16
C17
C19
C20
C21
C22
C23
C25
C26
C27
R1
R2
R3
R4
R5
R6
R8
R9
R11
R12
R13
R14
R15
R16
R17
R18
R20
R21
R22
R23
R24

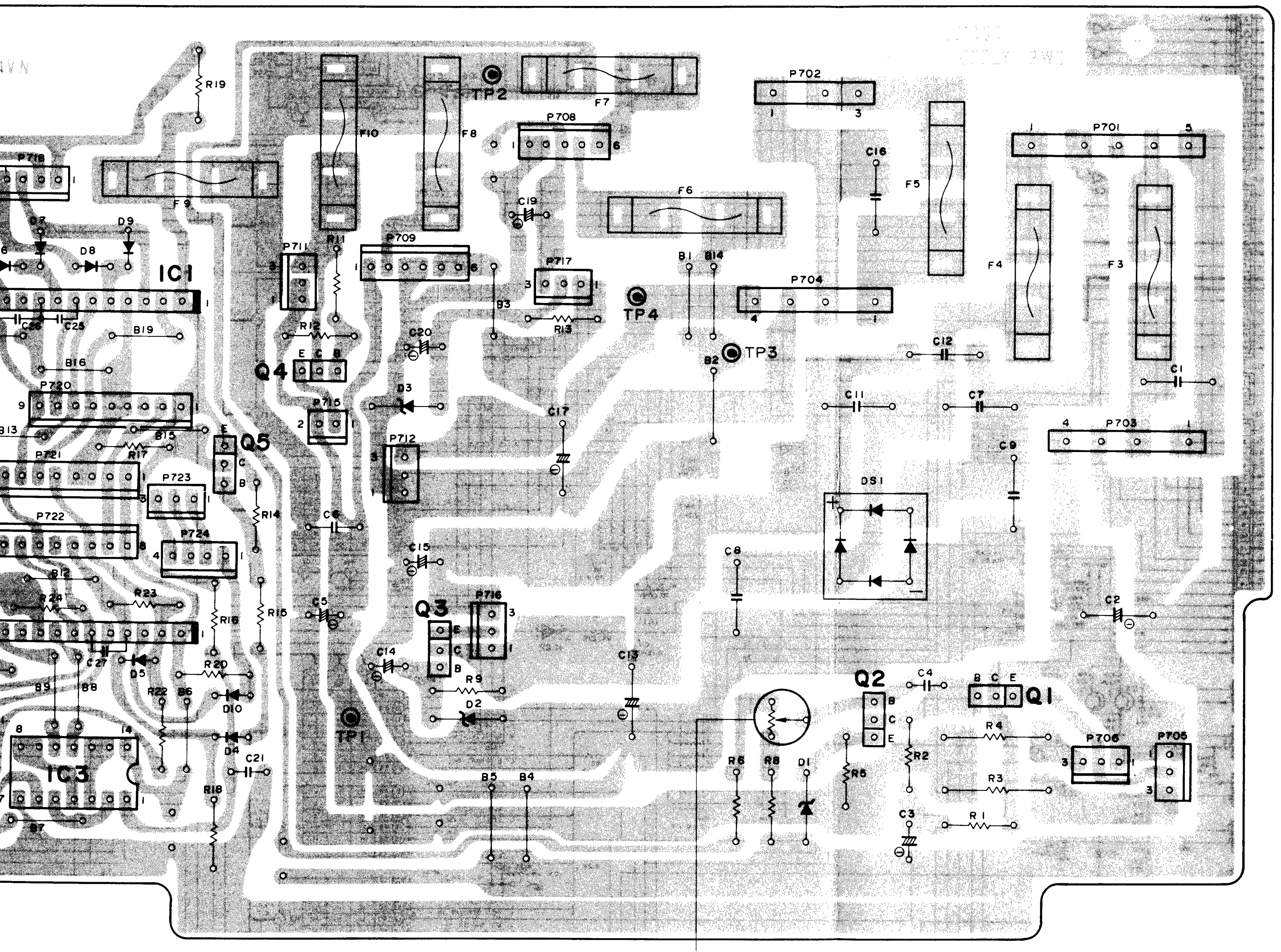
R7 12V ADJ

– POWER DIODE –


POWER DIODE
C5007
C5006

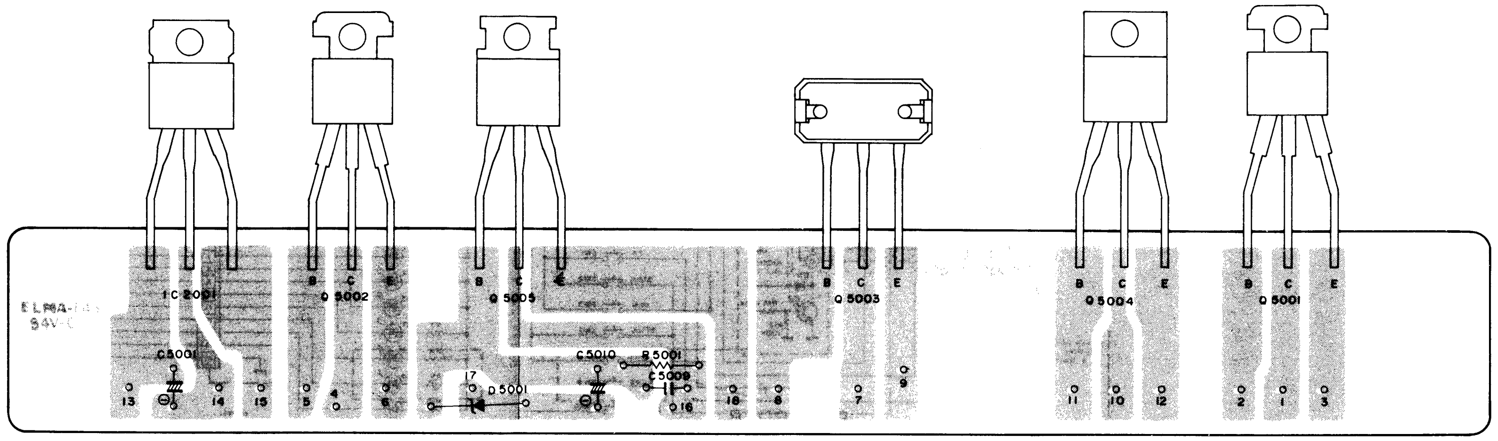
ER AND DIODE CIRCUIT BOARD (PWB)

– POWER SUPPLY BOARD –

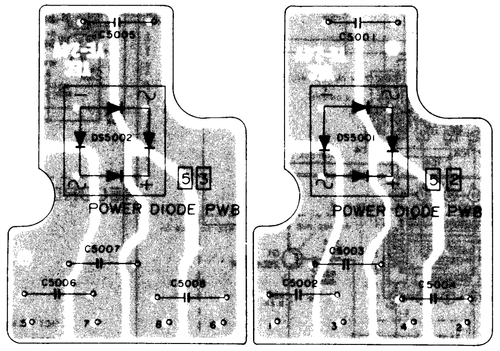

TP2
TP4
TP3
TP1
IC1
IC3
Q4
Q5
Q3
Q2
Q1
DS1
F3
F4
F5
F6
F7
F8
F9
F10
P701
P702
P703
P704
P705
P706
P708
P709
P711
P712
P715
P716
P717
P718
P720
P721
P722
P723
P724
C1
C2
C3
C4
C5
C6
C7
C8
C9
C11
C12
C13
C14
C15
C16
C17
C19
C20
C21
C25
C26
C27
R1
R2
R3
R4
R5
R6
R8
R9
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R22
R23
R24
D1
D2
D3
D4
D5
D8
D9
D10
B1
B2
B3
B4
B5
B6
B7
B8
B9
B13
B14
B15
B16
B19
E C B
B C E

R7 12V ADJ

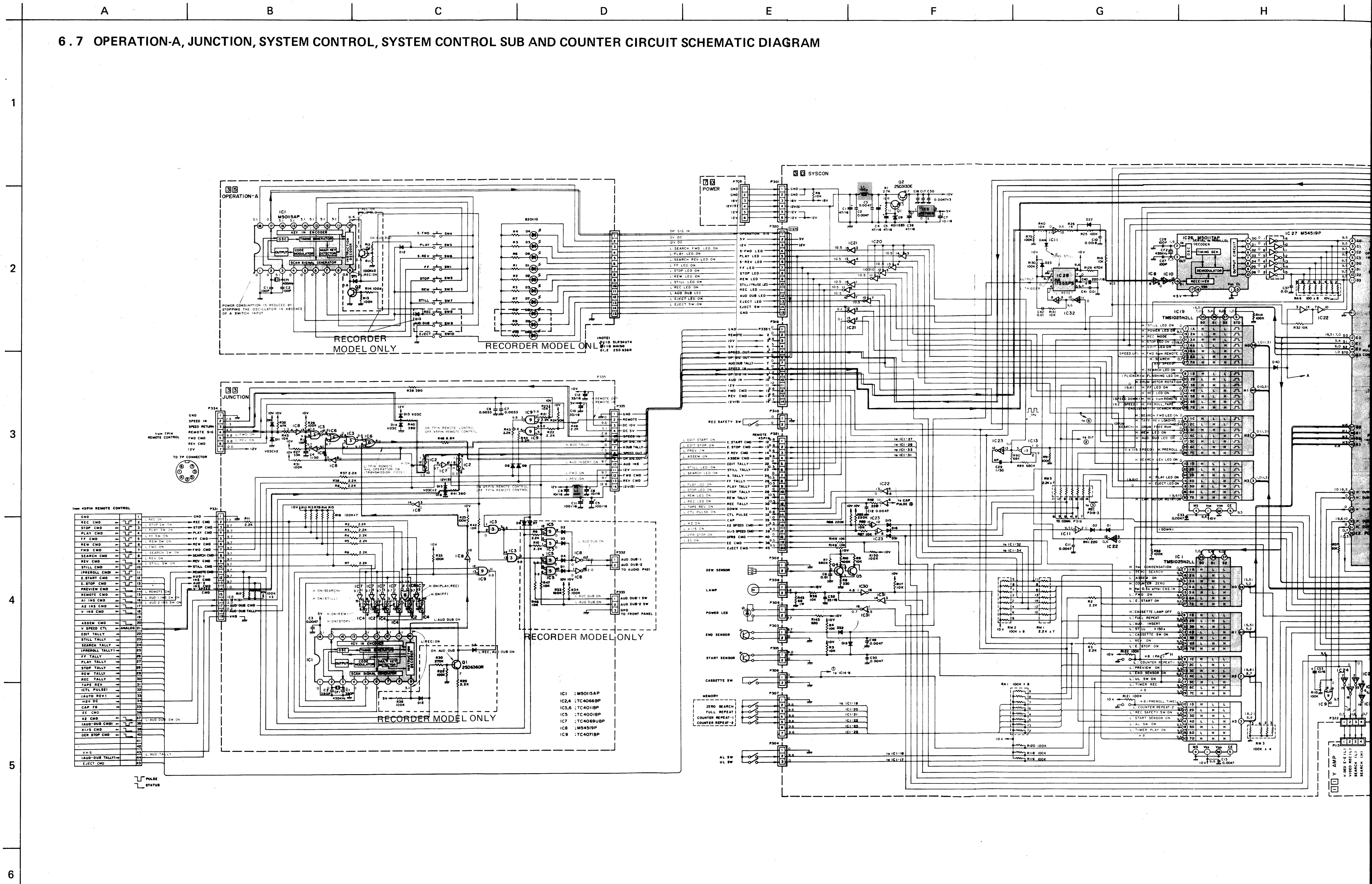
– POWER TRANSISTOR BOARD –


IC 2001
Q 5002
Q 5005
Q 5003
Q 5004
Q 5001
C5001
C5010
R5001
C5009
D5001
B C E
13
14
15
5
4
6
17
16
18
8
7
9
11
10
12
2
1
3

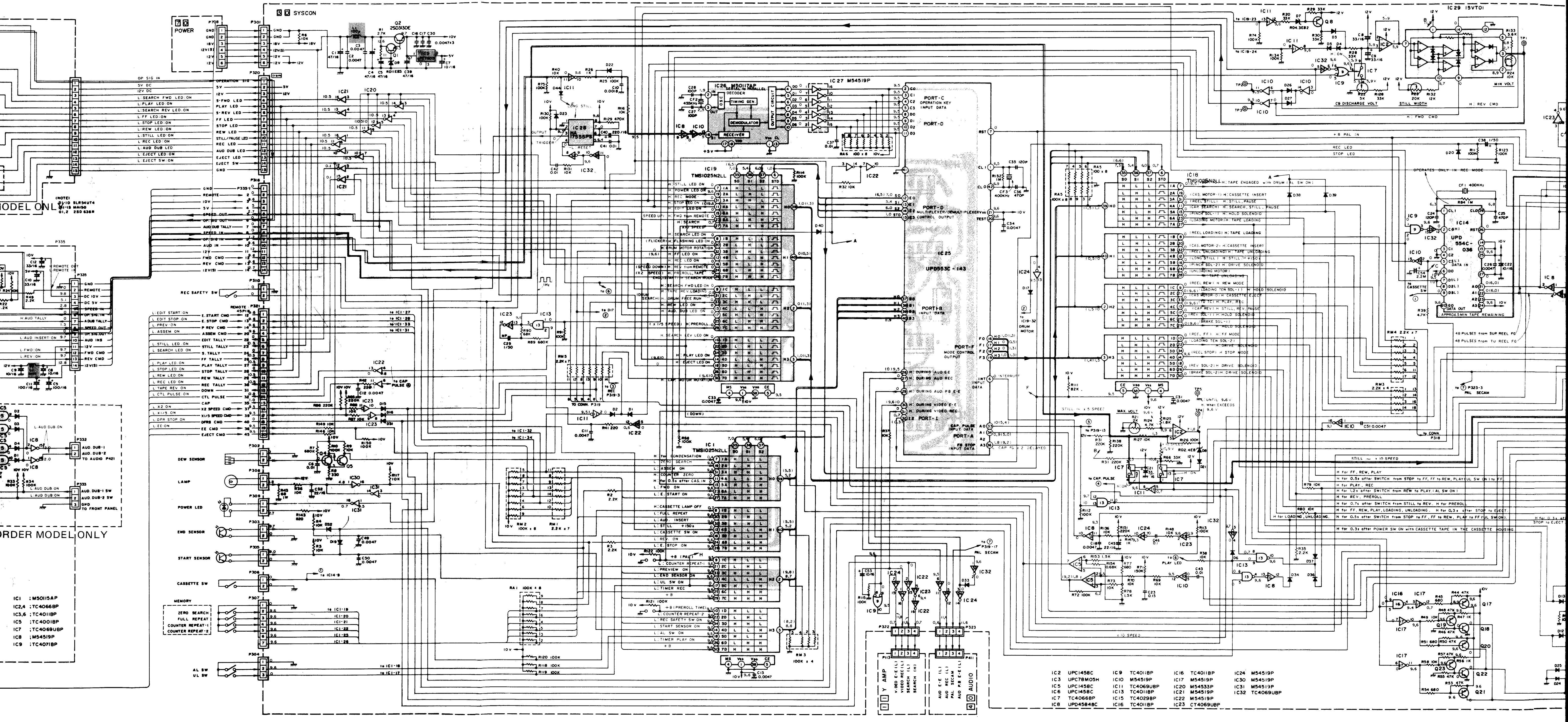
– POWER DIODE –

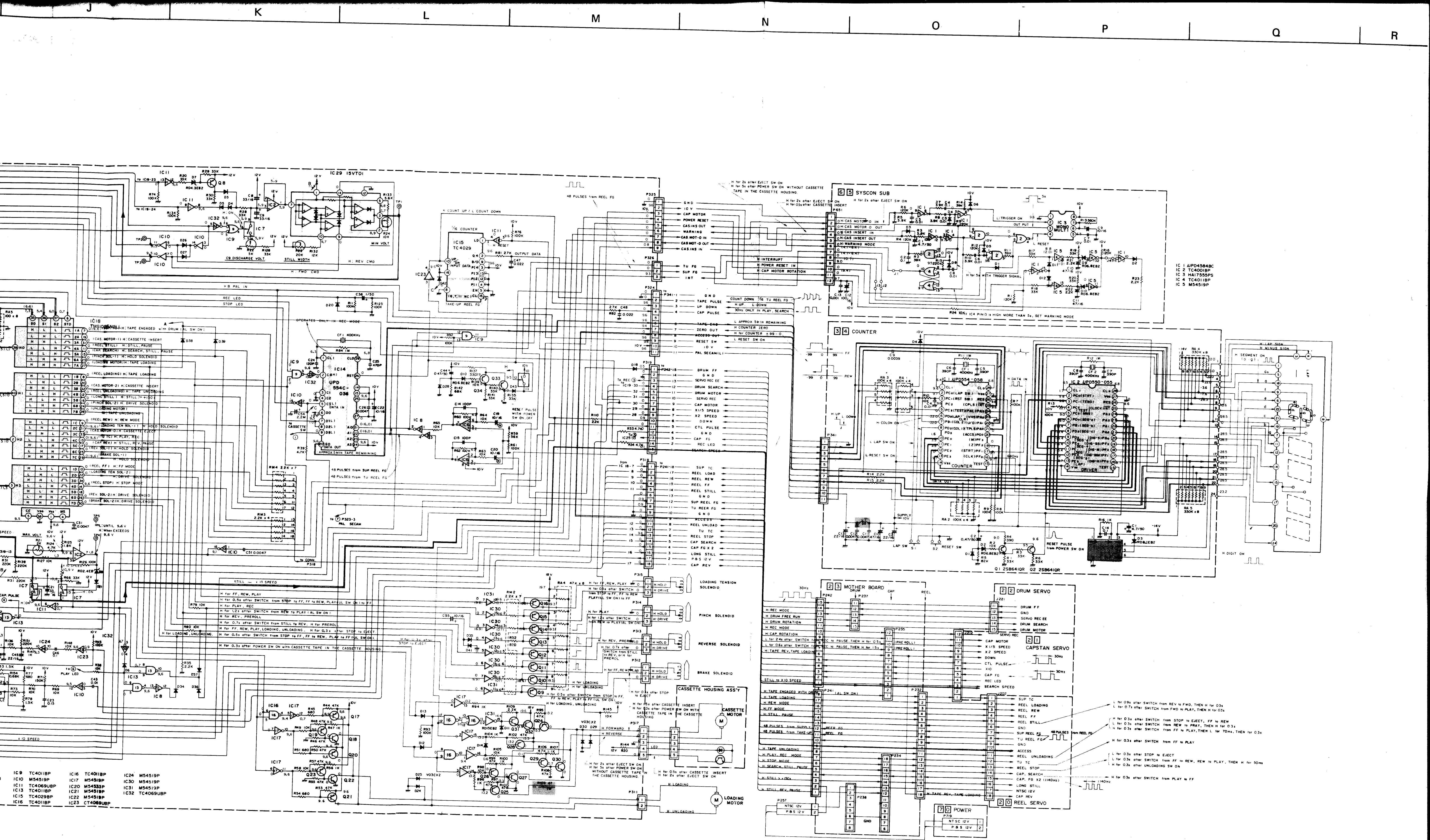

C5005
C5001
DS5002
DS5001
POWER DIODE PWB
C5007
C5006
C5008
C5003
C5002
C5004

6.7 OPERATION-A, JUNCTION, SYSTEM CONTROL, SYSTEM CONTROL SUB AND COUNTER CIRCUIT SCHEMATIC DIAGRAM


A
B
C
D
E
F
G
H
1
2
3
4
5
6
OPERATION-A
JUNCTION
SYSCON
POWER
IC1 M50115AP
KEY IN ENCODER
RECORDER MODEL ONLY
RECORDER MODEL ONLY
RECORDER MODEL ONLY
RECORDER MODEL ONLY
from 45PIN REMOTE CONTROL
from 7PIN REMOTE CONTROL
TO 7P CONNECTOR
IC19 TMS1025N2LL
IC1 TMS1025N2LL
IC26 M50117AP
IC27 M54519P
IC28 M51955PS
IC1 :M50115AP
IC2,4 :TC4066BP
IC3,6 :TC4011BP
IC5 :TC4001BP
IC7 :TC4069UBP
IC8 :M54519P
IC9 :TC4071BP
PULSE
STATUS
DEW SENSOR
LAMP
POWER LED
END SENSOR
START SENSOR
CASSETTE SW
MEMORY
ZERO SEARCH
FULL REPEAT
COUNTER REPEAT-1
COUNTER REPEAT-2
AL SW
UL SW
Y AMP

D COUNTER CIRCUIT SCHEMATIC DIAGRAM


SYSCON
POWER
P301
P320
P310
P316
P332
P333
P302
P306
P309
P303
P305
P304
P307
P322
P323
IC19 TMS1025N2LL
IC1 TMS1025N2LL
IC18 TMS1025N2LL
IC25 UPD553C-143
IC26 M50117AP
IC27 M54519P
IC28 NE555PS
IC29
IC14 UPD554C-036
PORT-C
PORT-D
PORT-B
PORT-F
PORT-A
PORT-E
RECEIVER
DEMODULATOR
TIMING GEN
DEW SENSOR
LAMP
POWER LED
END SENSOR
START SENSOR
CASSETTE SW
MEMORY
ZERO SEARCH
FULL REPEAT
COUNTER REPEAT-1
COUNTER REPEAT-2
AL SW
UL SW
Y AMP
AUDIO
REC SAFETY SW
ODEL ONLY
ORDER MODEL ONLY
L AUD DUB ON
AUD. DUB-1
AUD. DUB-2
TO AUDIO P421
AUD. DUB-1 SW
AUD. DUB-2 SW
TO FRONT PANEL
C9 DISCHARGE VOLT
STILL WIDTH
MIN VOLT
H: REV CMD
H: FWD CMD
REC LED
STOP LED
OPERATES ONLY IN REC MODE
APPROX 5MIN TAPE REMAINING
48 PULSES from SUP REEL FG
48 PULSES from TU REEL FG
PAL SECAM
DRUM MOTOR
x 10 SPEED
IC1 ;M50115AP
IC2,4 ;TC4066BP
IC3,6 ;TC4011BP
IC5 ;TC4001BP
IC7 ;TC4069UBP
IC8 ;M54519P
IC9 ;TC4071BP
IC2 UPC1458C
IC3 UPC78M05H
IC5 UPC1458C
IC6 UPC1458C
IC7 TC4066BP
IC8 UPD4584BC
IC9 TC4011BP
IC10 M54519P
IC11 TC4069UBP
IC13 TC4011BP
IC15 TC4029BP
IC16 TC4011BP
IC16 TC4011BP
IC17 M54519P
IC20 M54533P
IC21 M54519P
IC22 M54519P
IC23 CT4069UBP
IC24 M54519P
IC30 M54519P
IC31 M54519P
IC32 TC4069UBP


J
K
L
M
N
O
P
Q
R
6 5 SYSCON SUB
3 4 COUNTER
2 3 MOTHER BOARD
2 2 DRUM SERVO
2 1 CAPSTAN SERVO
2 0 REEL SERVO
7 0 POWER
CASSETTE HOUSING ASS'Y
CASSETTE MOTOR
LOADING MOTOR
LOADING TENSION SOLENOID
PINCH SOLENOID
REVERSE SOLENOID
BRAKE SOLENOID
IC 1 UPD554-058
IC 2 UPD550-055
DRIVER
COUNTER
IC14 UPD 554C-036
IC15 TC4029
IC29 15VTO1
Q1 2SB641QR Q2 2SB641QR

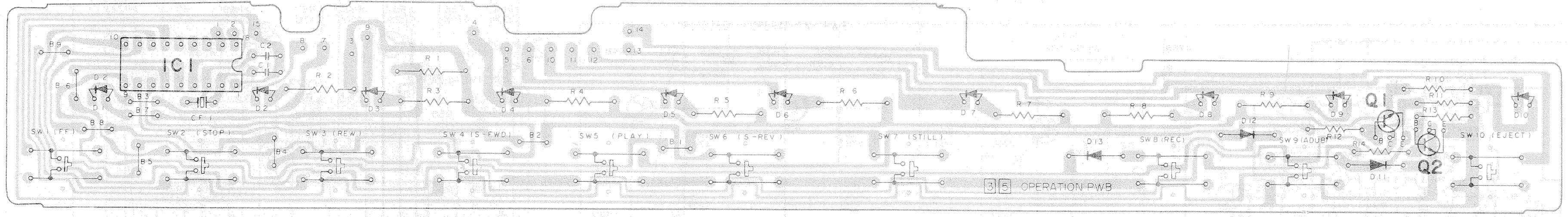
NOTE:
Shaded (▨) parts are critical for safety.
Replace only with specified part nombers.

OP-A, JUNCTION, SYSCON SCHEMATIC
(POWER, TRANS, DIODE, SCHEMATIC & BOARD) 6-6

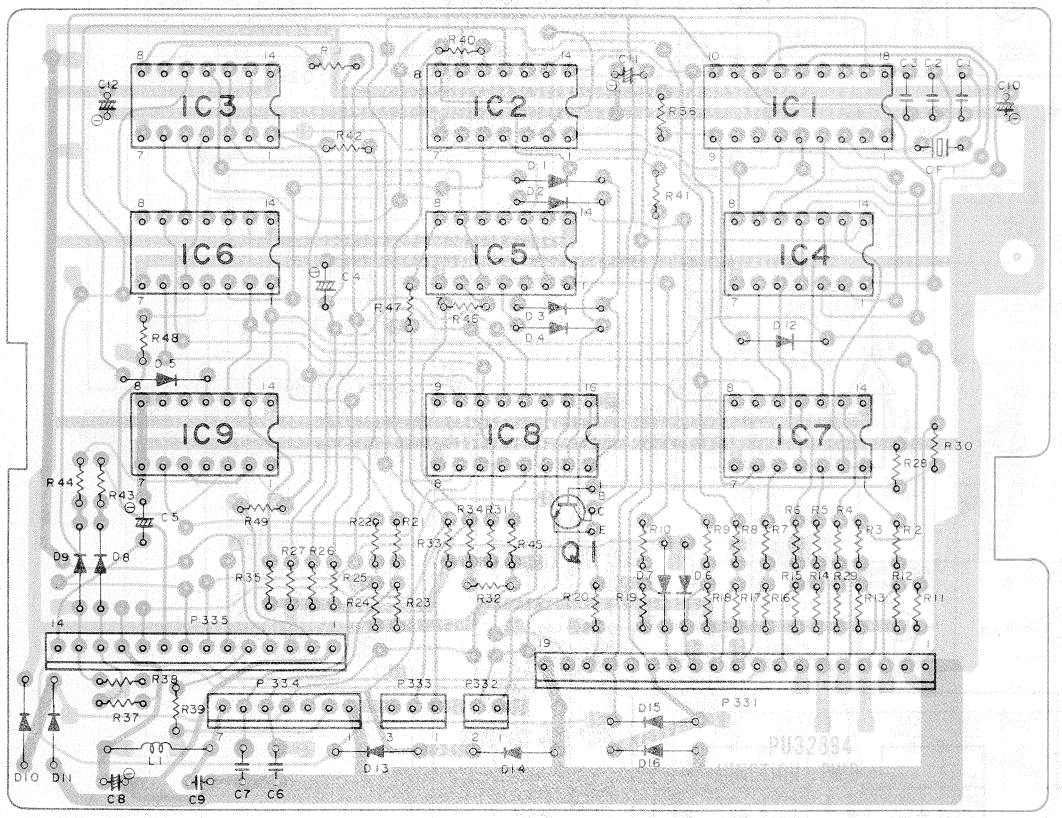
6-6 OP-A, JUNCTION, SYSCON SCHEMATIC
(POWER, TRANS, DIODE, SCHEMATIC & BOARD)

6 . 8 OPERATION-A, JUNCTION, SYSTEM CONTROL, SYSTEM CONTROL SUB AND COUNTER BOARDS

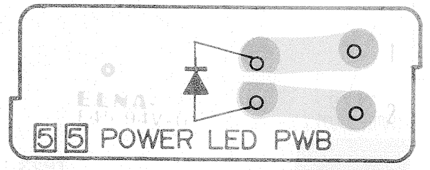
– OPERATION-A –


IC1
SW1 (FF)
SW2 (STOP)
SW3 (REW)
SW4 (S-FWD)
SW5 (PLAY)
SW6 (S-REV)
SW7 (STILL)
SW8 (REC)
SW9 (ADUB)
SW10 (EJECT)
Q1
Q2
35 OPERATION PWB

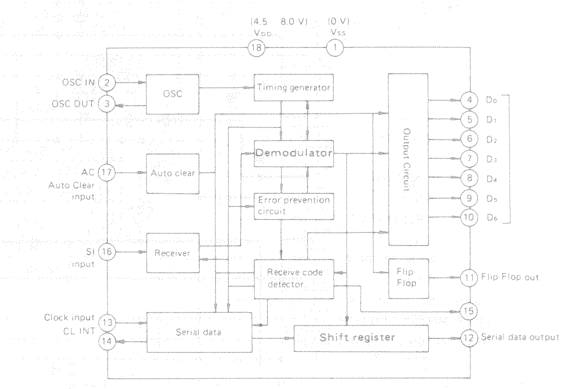
– JUNCTION –


IC3
IC2
IC1
IC6
IC5
IC4
IC9
IC8
IC7
Q1
P335
P334
P333
P332
P331
PU32894
JUNCTION PWB

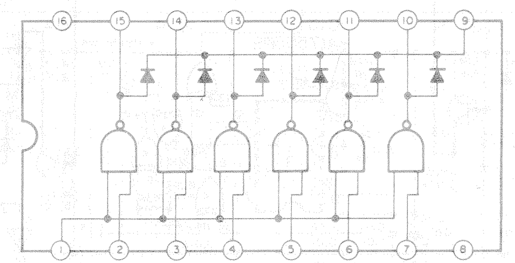
– POWER LED –


55 POWER LED PWB

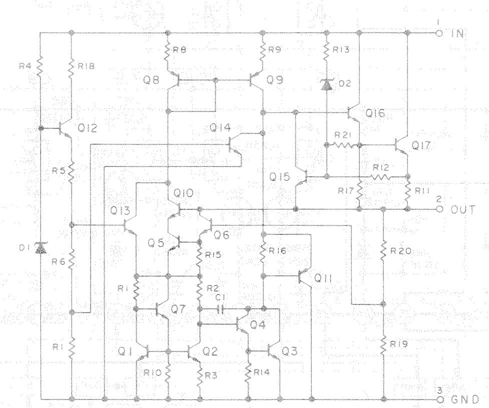
– M50117AP –


OSC
Timing generator
Auto clear
Demodulator
Error prevention circuit
Output Circuit
Receiver
Receive code detector
Flip Flop
Serial data
Shift register
OSC IN
OSC OUT
AC Auto Clear input
SI input
Clock input CL INT
Flip Flop out
Serial data output

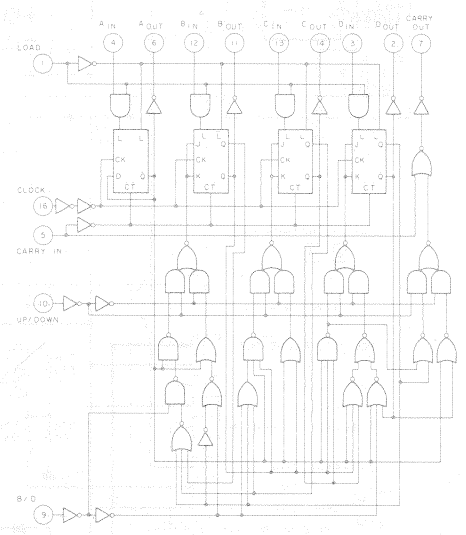
– M54533P –



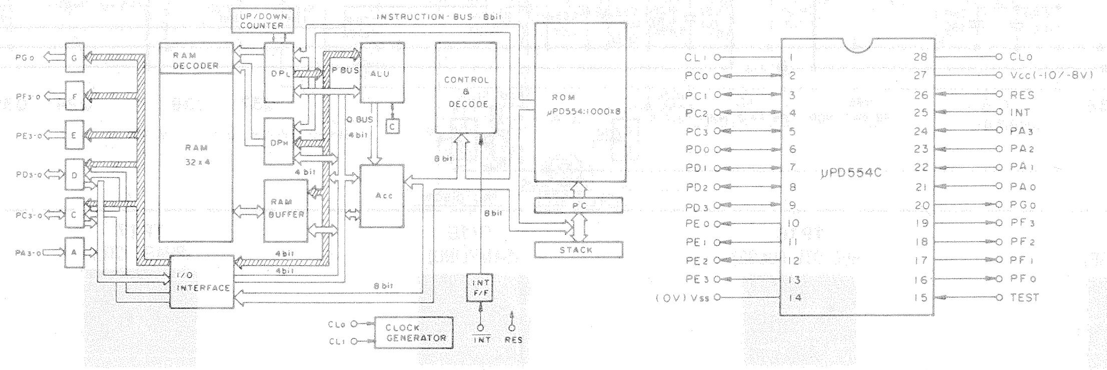
– UPC78M05H –



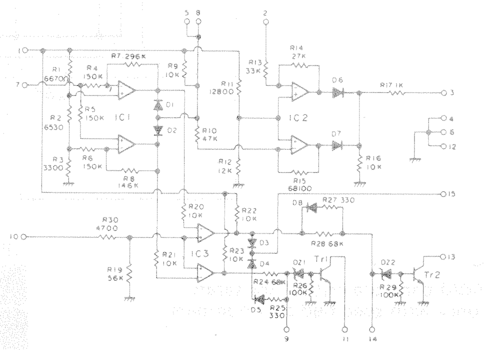
– TC-4029BP –


LOAD
CLOCK
CARRY IN
UP/DOWN
B/D

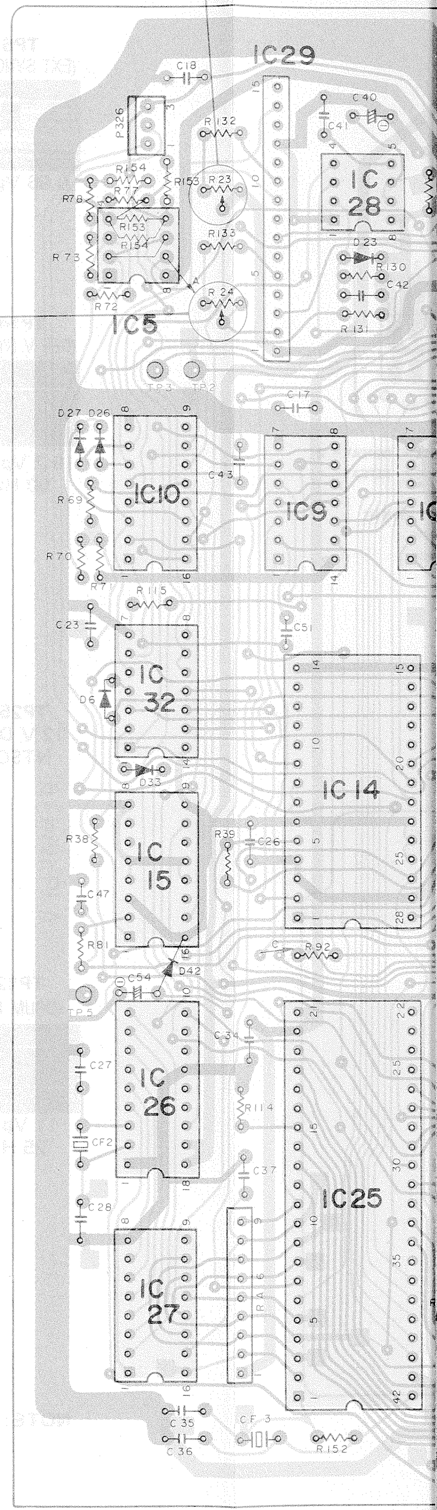
– UPD554C-036 –


UP/DOWN COUNTER
INSTRUCTION BUS 8bit
RAM DECODER
RAM 32x4
RAM BUFFER
ALU
Acc
CONTROL & DECODE
ROM μPD554(1000x8)
PC
STACK
I/O INTERFACE
CLOCK GENERATOR
INT F/F
INT
RES
μPD554C
TEST

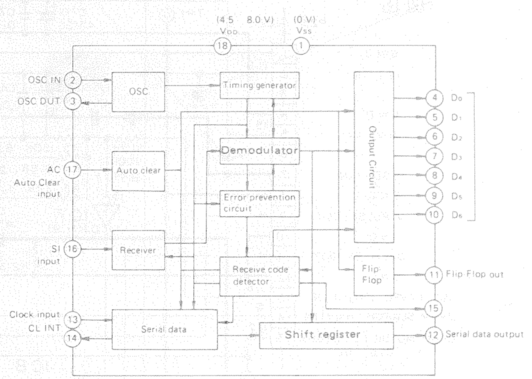
– 15VT01 –



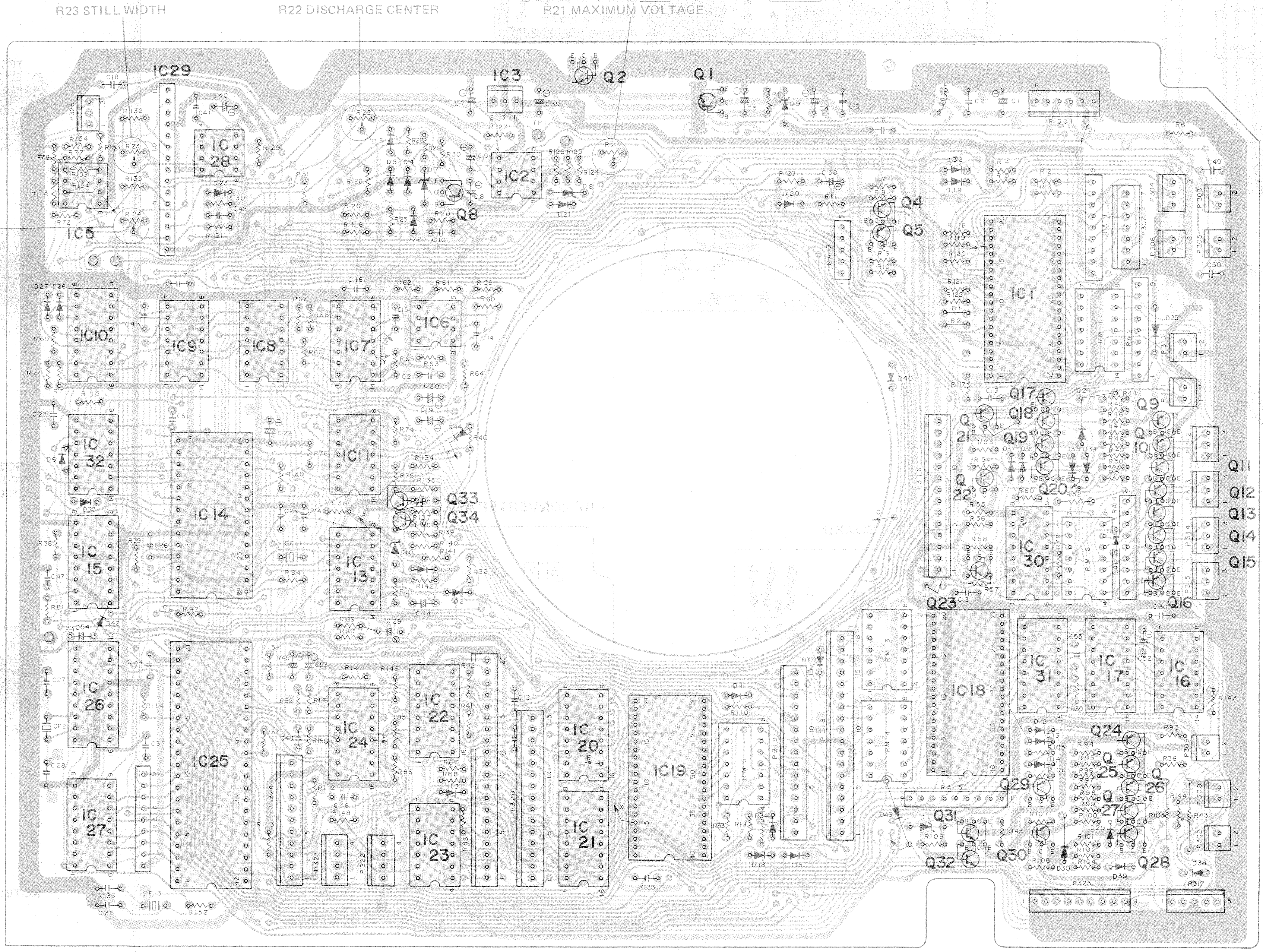
– SYSTEM CONTROL –


R23 STILL WIDTH
R24 TINIMUM VOLTAGE
IC29
IC28
IC5
IC10
IC9
IC32
IC14
IC15
IC26
IC25
IC27

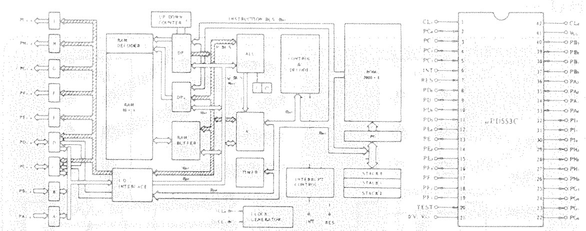
– M50117AP –


(4.5 8.0 V) VDD
(0 V) Vss
OSC IN
OSC OUT
AC Auto Clear input
SI input
Clock input CL INT
OSC
Timing generator
Demodulator
Auto clear
Error prevention circuit
Receiver
Receive code detector
Serial data
Shift register
Output Circuit
Flip Flop
D0 D1 D2 D3 D4 D5 D6
Flip Flop out
Serial data output

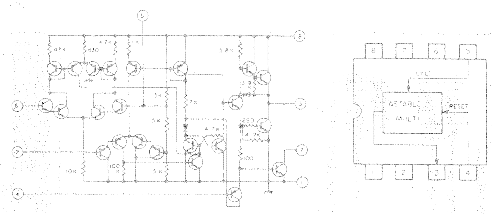
– SYSTEM CONTROL –


R23 STILL WIDTH
R22 DISCHARGE CENTER
R21 MAXIMUM VOLTAGE
R24 TINIMUM VOLTAGE
IC1 IC2 IC3 IC5 IC6 IC7 IC8 IC9 IC10 IC11 IC13 IC14 IC15 IC16 IC17 IC18 IC19 IC20 IC21 IC22 IC23 IC24 IC25 IC26 IC27 IC28 IC29 IC30 IC31 IC32
Q1 Q2 Q4 Q5 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q31 Q32 Q33 Q34

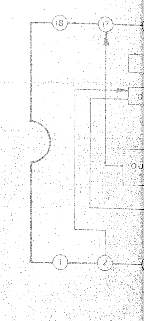
– UPD553C-143 –



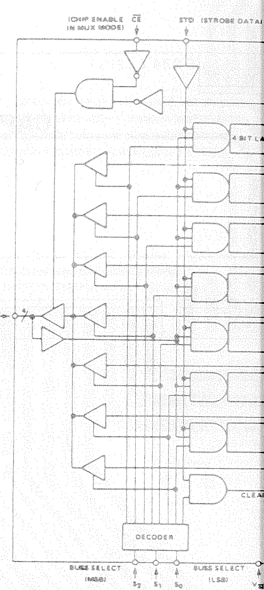
– HA17555PS –



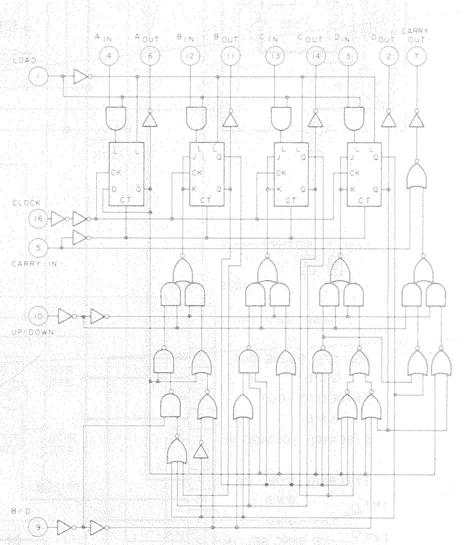
– M50115AP



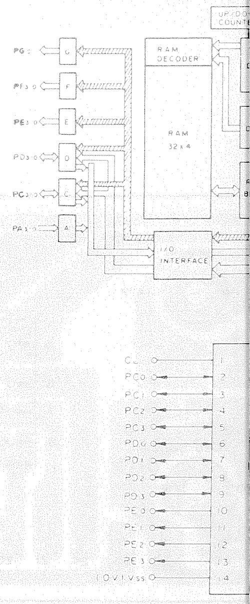
– TMS1025N2LL –



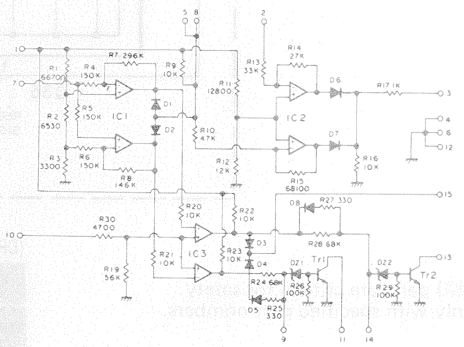
– TC-4029BP –


LOAD
CLOCK
CARRY IN
UP/DOWN
B/D
CARRY OUT

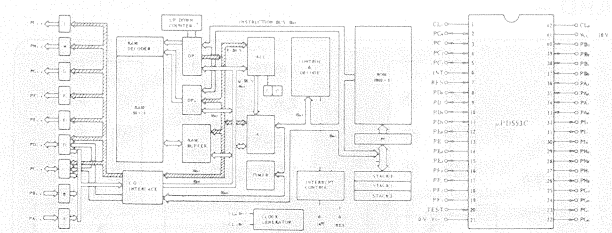
– UPD550-055 –



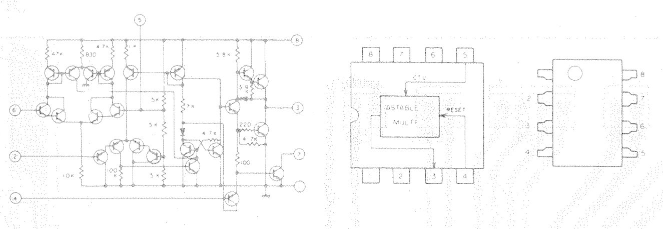
– 15VT01 –



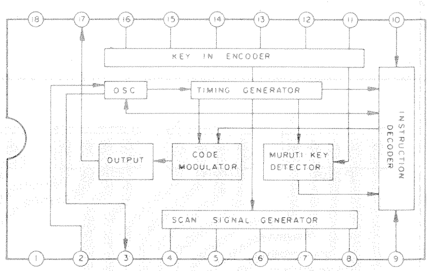
— UPD553C-143 —



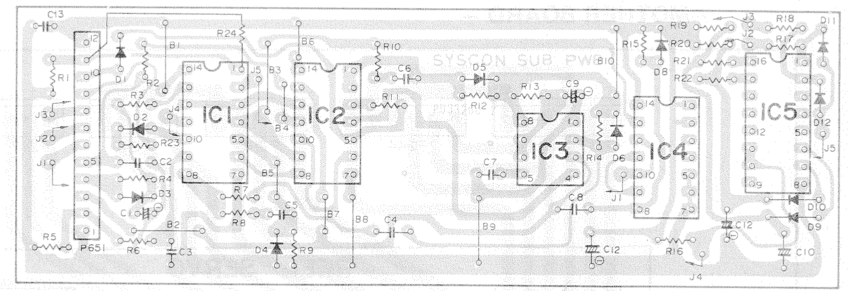
— HA17555PS —


ASTABLE MULTI
RESET

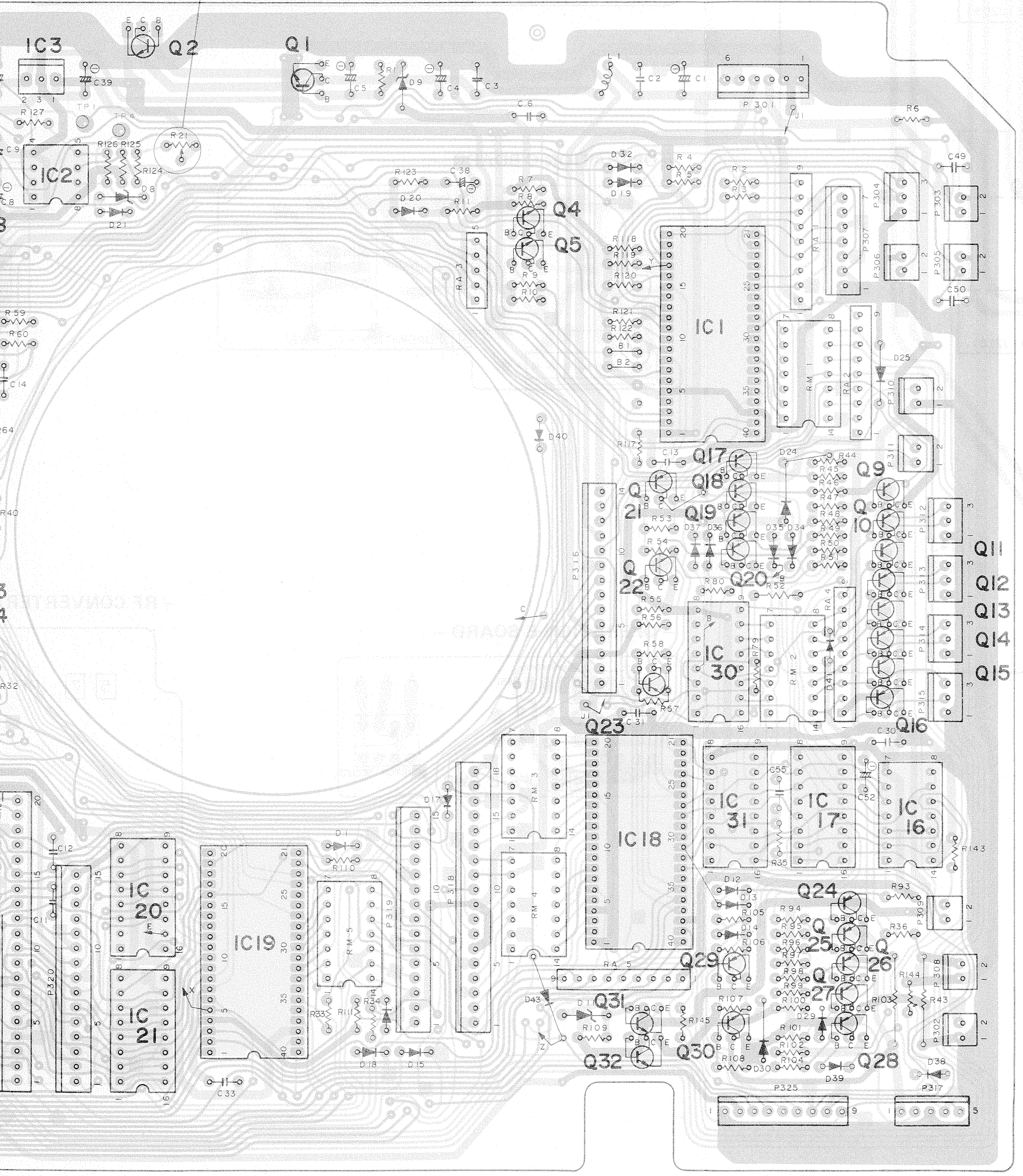
— M50115AP —


KEY IN ENCODER
OSC
TIMING GENERATOR
OUTPUT
CODE MODULATOR
MURUTI KEY DETECTOR
INSTRUCTION DECODER
SCAN SIGNAL GENERATOR

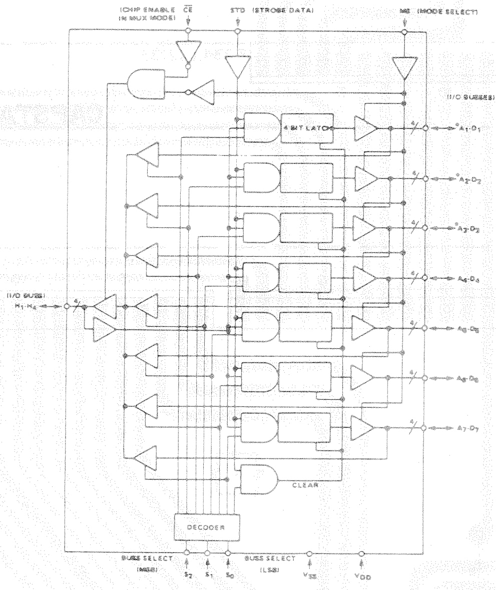
— SYSTEM SUB CONTROL —


IC1
IC2
IC3
IC4
IC5
C13
R1
R24
R10
C6
D5
R13
C9
R15
R19
R20
R22
R18
R17
D8
C7
C8
C12
R16
J4
C10
D9
R5
P651
R6
C3
D4
R9
B9
C4
B8
B7
B5
B2
D2
D3
R4
R3

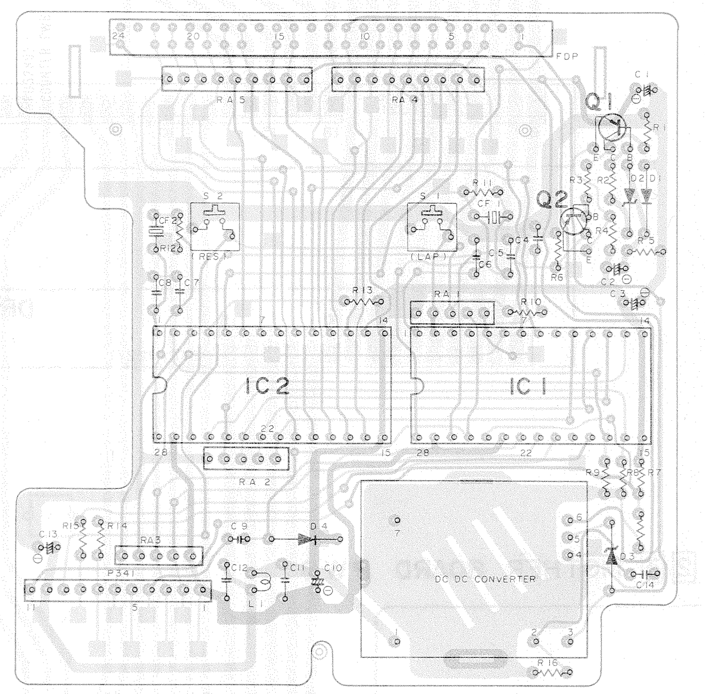
R21 MAXIMUM VOLTAGE


IC3
Q2
Q1
IC2
Q4
Q5
IC1
Q17
Q18
Q19
Q21
Q22
Q20
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q23
IC30
IC18
IC31
IC17
IC16
IC20
IC21
IC19
Q24
Q25
Q26
Q27
Q28
Q29
Q30
Q31
Q32
P301
P303
P304
P305
P306
P307
P310
P311
P312
P313
P314
P315
P316
P317
P318
P319
P320
P325
RA1
RA3
RA4
RA5
RM1
RM2
RM3
RM4
RM5
R21
D40
C39
C3
C4
C5
C6
C49
C50
C12
C30
C31
C33
R127
R126
R125
R124
R123
R11
R6
R2
R4
D19
D20
D21
D32
D24
D25
D43
R143
R144
R93
R94
R36
R43
R145
R107
R108
R109
R103
R104
R101
R105
R106

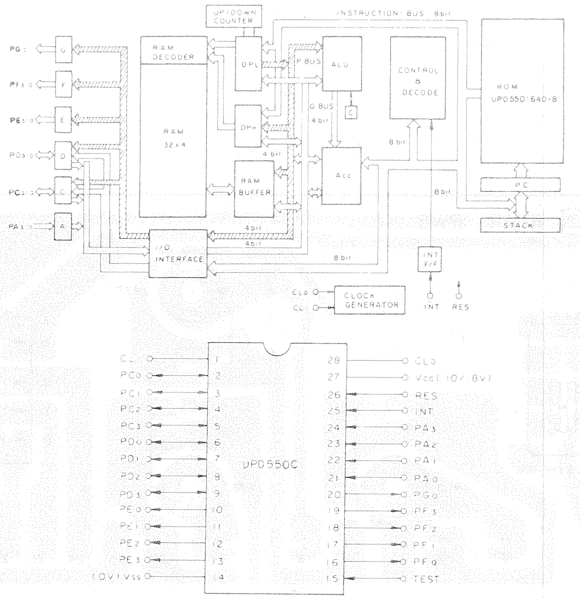
— TMS1025N2LL —


(CHIP ENABLE IN MUX MODE) CE
STD (STROBE DATA)
ME (MODE SELECT)
(I/O BUSES)
4 BIT LATCH
CLEAR
DECODER
I/O BUSES
BUSS SELECT (MSB)
BUSS SELECT (LSB)
VSS
VDD

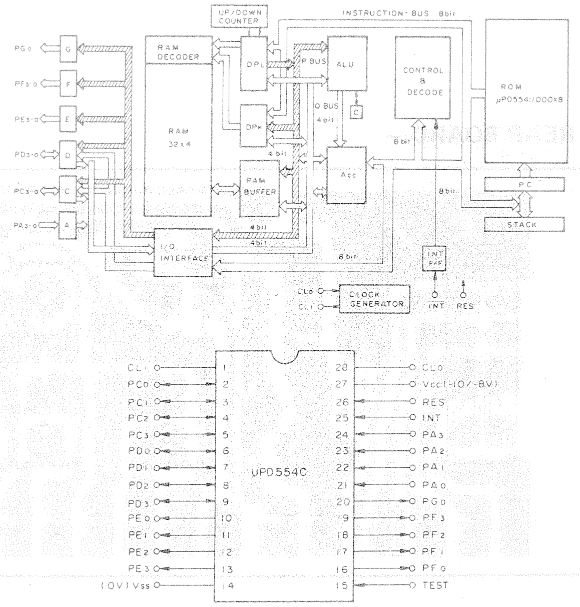
— COUNTER —


FOP
RA5
RA4
Q1
Q2
S2
RES
S1
LAP
R11
R13
RA1
R10
IC2
IC1
RA2
RA3
C13
R15
R14
P341
C9
D4
L1
C10
C14
R16
DC-DC CONVERTER

— UPD550-055 —

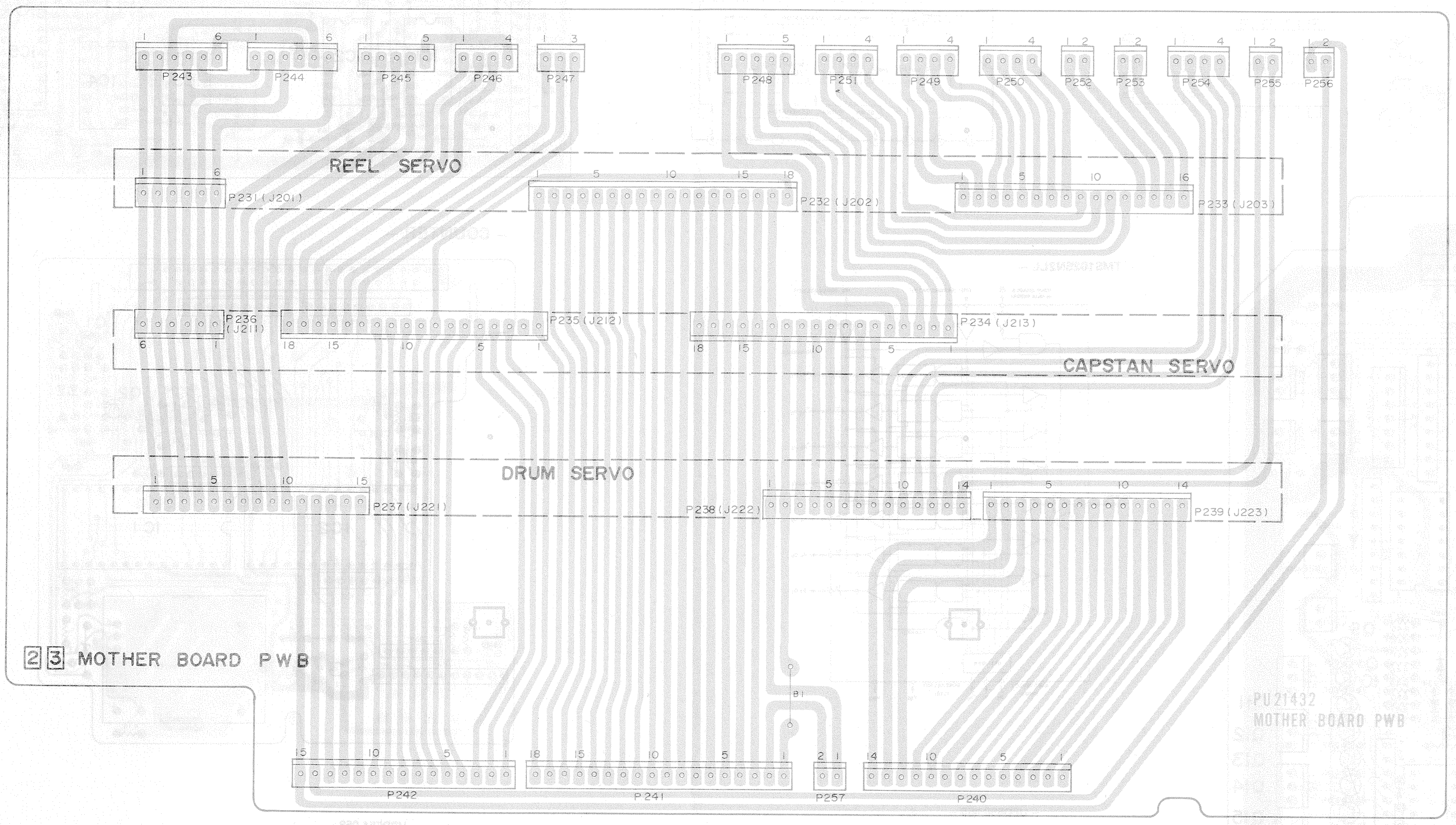

INSTRUCTION BUS 8bit
UP-DOWN COUNTER
RAM DECODER
RAM 32×4
RAM BUFFER
ALU
CONTROL & DECODE
ROM UPD550-640-B
STACK
I/O INTERFACE
CLOCK GENERATOR
INT F/F
INT
RES
UPD550C
CL1
PC0
PC1
PC2
PC3
PD0
PD1
PD2
PD3
PE0
PE1
PE2
PE3
(OV) VSS
CL0
VCC (-10/-8V)
RES
INT
PA3
PA2
PA1
PA0
PG0
PF3
PF2
PF1
PF0
TEST

— UPD554-058 —

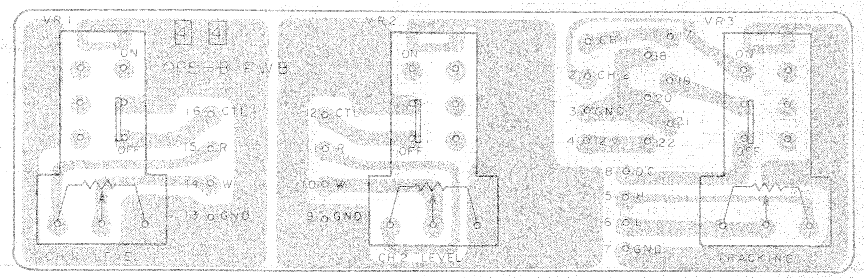

INSTRUCTION BUS 8bit
UP-DOWN COUNTER
RAM DECODER
RAM 32×4
RAM BUFFER
ALU
CONTROL & DECODE
ROM UPD554-1000-B
STACK
I/O INTERFACE
CLOCK GENERATOR
INT F/F
INT
RES
UPD554C
CL1
PC0
PC1
PC2
PC3
PD0
PD1
PD2
PD3
PE0
PE1
PE2
PE3
(OV) VSS
CL0
VCC (-10/-8V)
RES
INT
PA3
PA2
PA1
PA0
PG0
PF3
PF2
PF1
PF0
TEST

6.9 MOTHER, OPERATION-B, -C, -D, -E, RF CONVERTER AND REAR CIRCUIT BOARDS

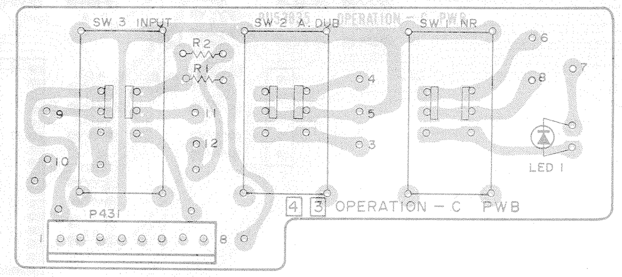
– MOTHER BOARD –


P243
P244
P245
P246
P247
P248
P251
P249
P250
P252
P253
P254
P255
P256
REEL SERVO
P231 (J201)
P232 (J202)
P233 (J203)
P236 (J211)
P235 (J212)
P234 (J213)
CAPSTAN SERVO
DRUM SERVO
P237 (J221)
P238 (J222)
P239 (J223)
2 3 MOTHER BOARD PWB
B1
P242
P241
P257
P240

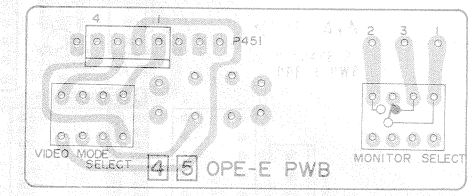
– OPERATION-B BOARD –


VR1
VR2
VR3
4 4 OPE-B PWB
ON
OFF
16 CTL
15 OR
14 OW
13 GND
12 CTL
11 OR
10 OW
9 GND
1 CH1
2 CH2
3 GND
4 12V
5 H
6 L
7 GND
8 DC
CH1 LEVEL
CH2 LEVEL
TRACKING

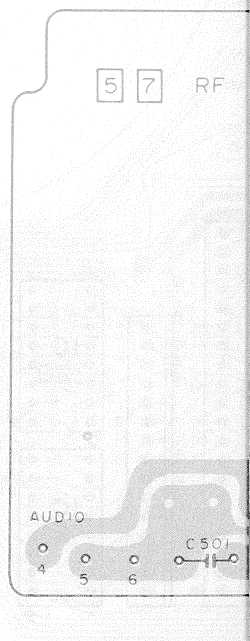
– OPERATION-C BOARD –


SW3 INPUT
SW2 A.DUB
SW1 NR
R2
R1
LED1
P431
4 3 OPERATION – C PWB

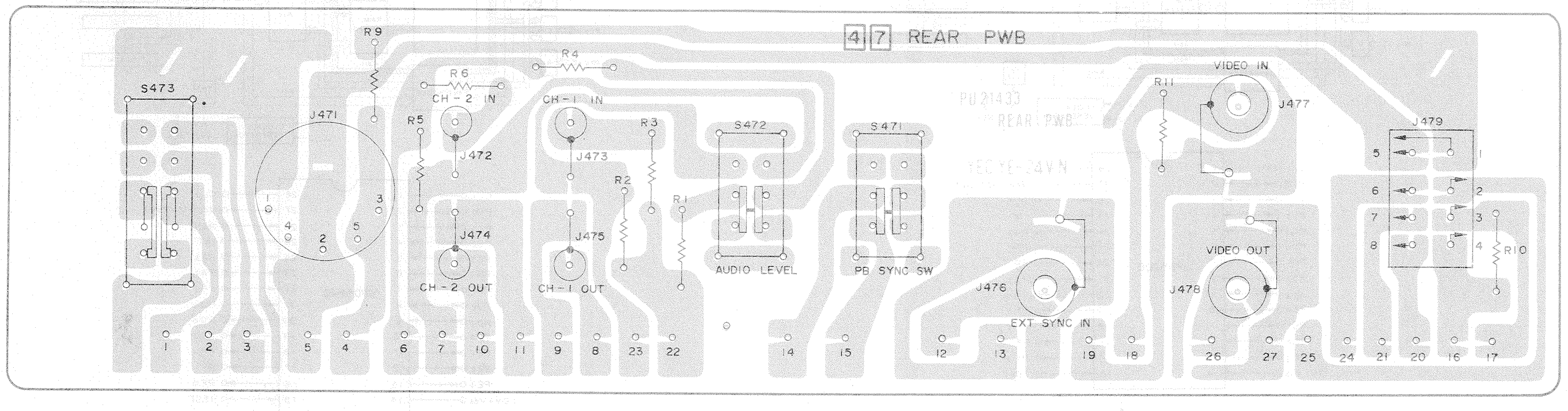
– OPERATION-E BOARD –


P451
VIDEO MODE SELECT
4 5 OPE-E PWB
MONITOR SELECT

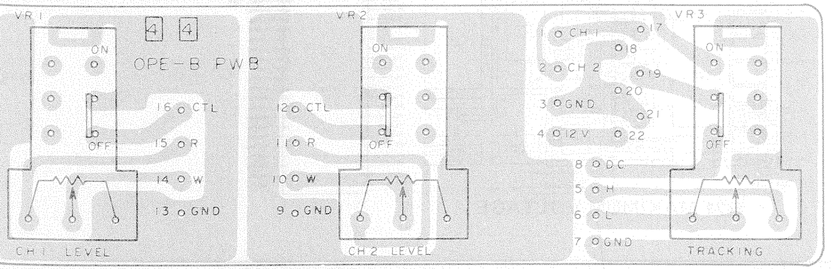
– RF CONVERTER


5 7 RF
AUDIO
C501

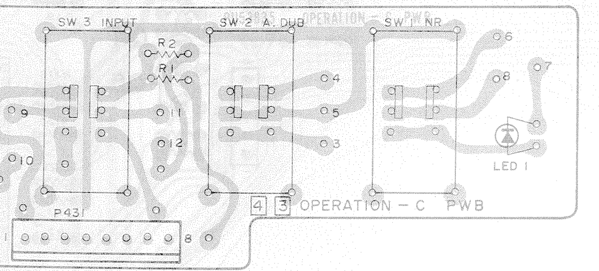
– REAR BOARD –


4 7 REAR PWB
S473
R9
J471
R6
CH-2 IN
R4
CH-1 IN
R5
J472
J473
R3
R2
R1
S472
S471
J474
CH-2 OUT
J475
CH-1 OUT
AUDIO LEVEL
PB SYNC SW
J476
EXT SYNC IN
R11
VIDEO IN
J477
VIDEO OUT
J478
J479
R10

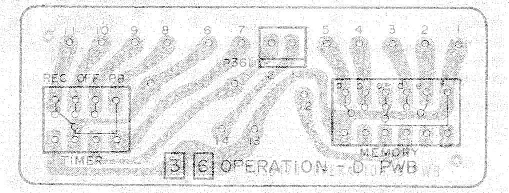
- OPERATION-B BOARD -


VR1
VR2
VR3
4 4 OPE-B PWB
16 CTL
15 R
14 W
13 GND
12 CTL
11 R
10 W
9 GND
1 CH1
2 CH2
3 GND
4 12V
8 DC
5 H
6 L
7 GND
ON
OFF
CH1 LEVEL
CH2 LEVEL
TRACKING

- OPERATION-C BOARD -

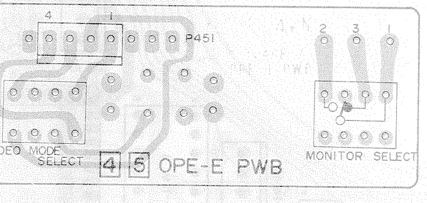

SW3 INPUT
SW2 A. DUB
SW NR
LED 1
P431
4 3 OPERATION - C PWB

- OPERATION-D BOARD -

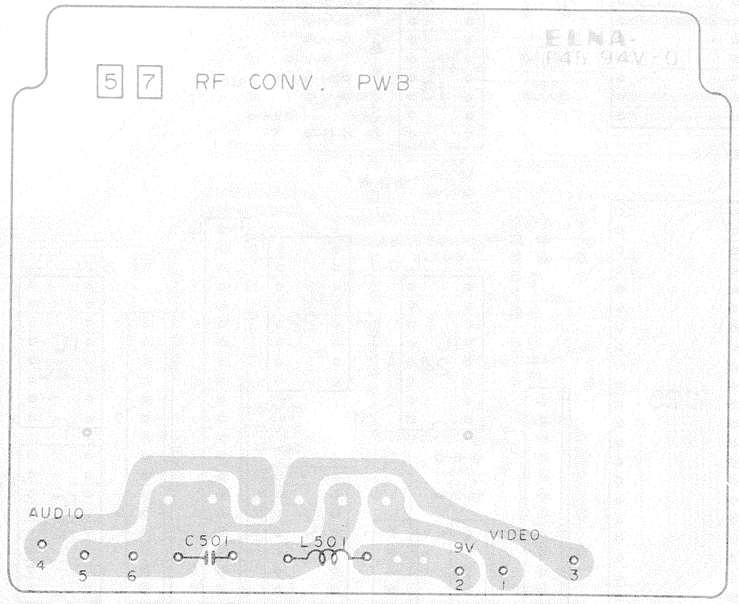

REC OFF PB
TIMER
P361
MEMORY
3 6 OPERATION - D PWB

a : COUNTER REPEAT - 2
b : COUNTER REPEAT - 1
c : OFF
d : FULL REPEAT
e : SEARCH
f : COMMON

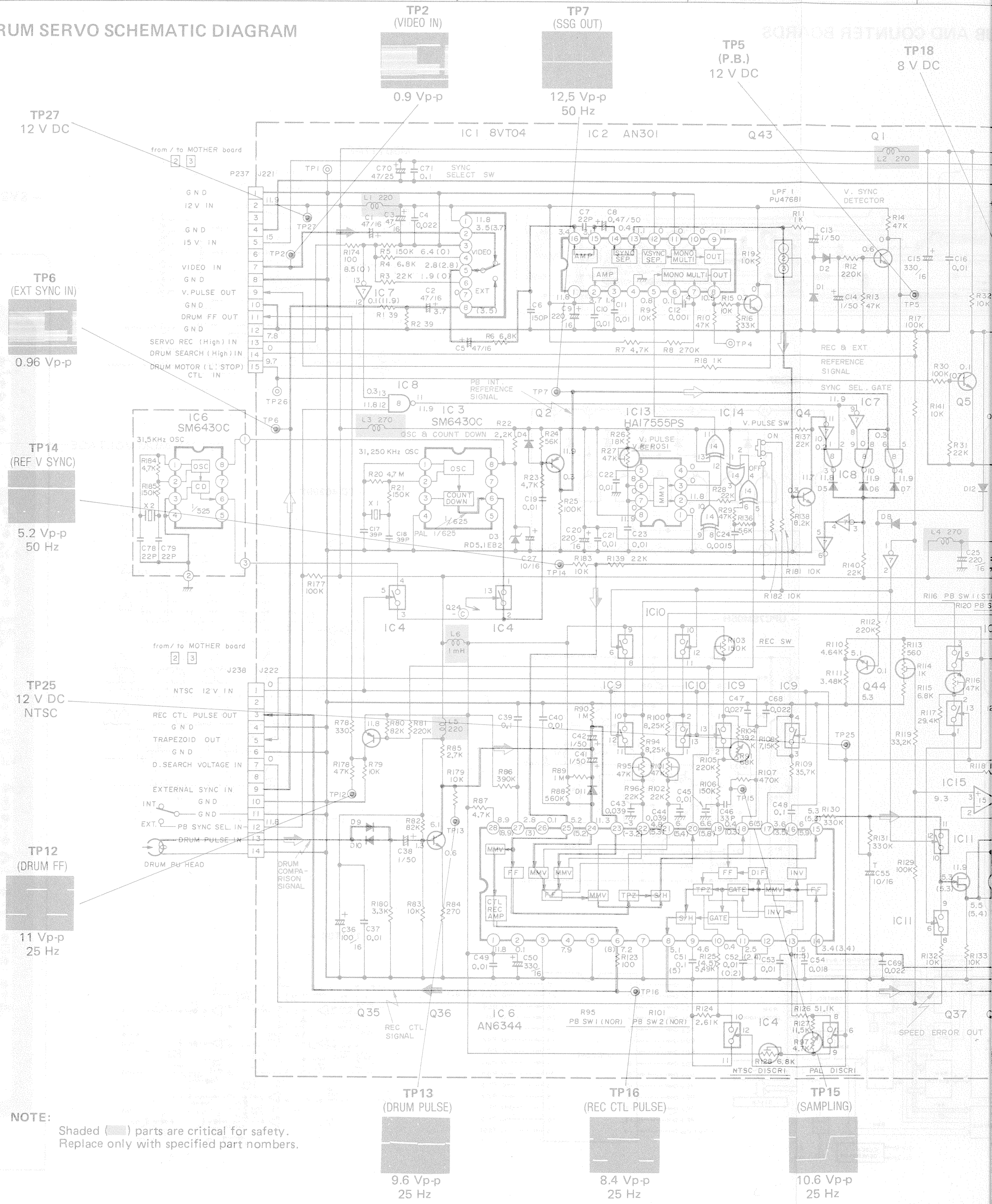
- OPERATION-E BOARD -


R451
VIDEO MODE SELECT
MONITOR SELECT
4 5 OPE-E PWB

- RF CONVERTER MOUNT BOARD -


5 7 RF CONV. PWB
AUDIO
C501
L501
VIDEO
9V
4 5 6 2 1 3

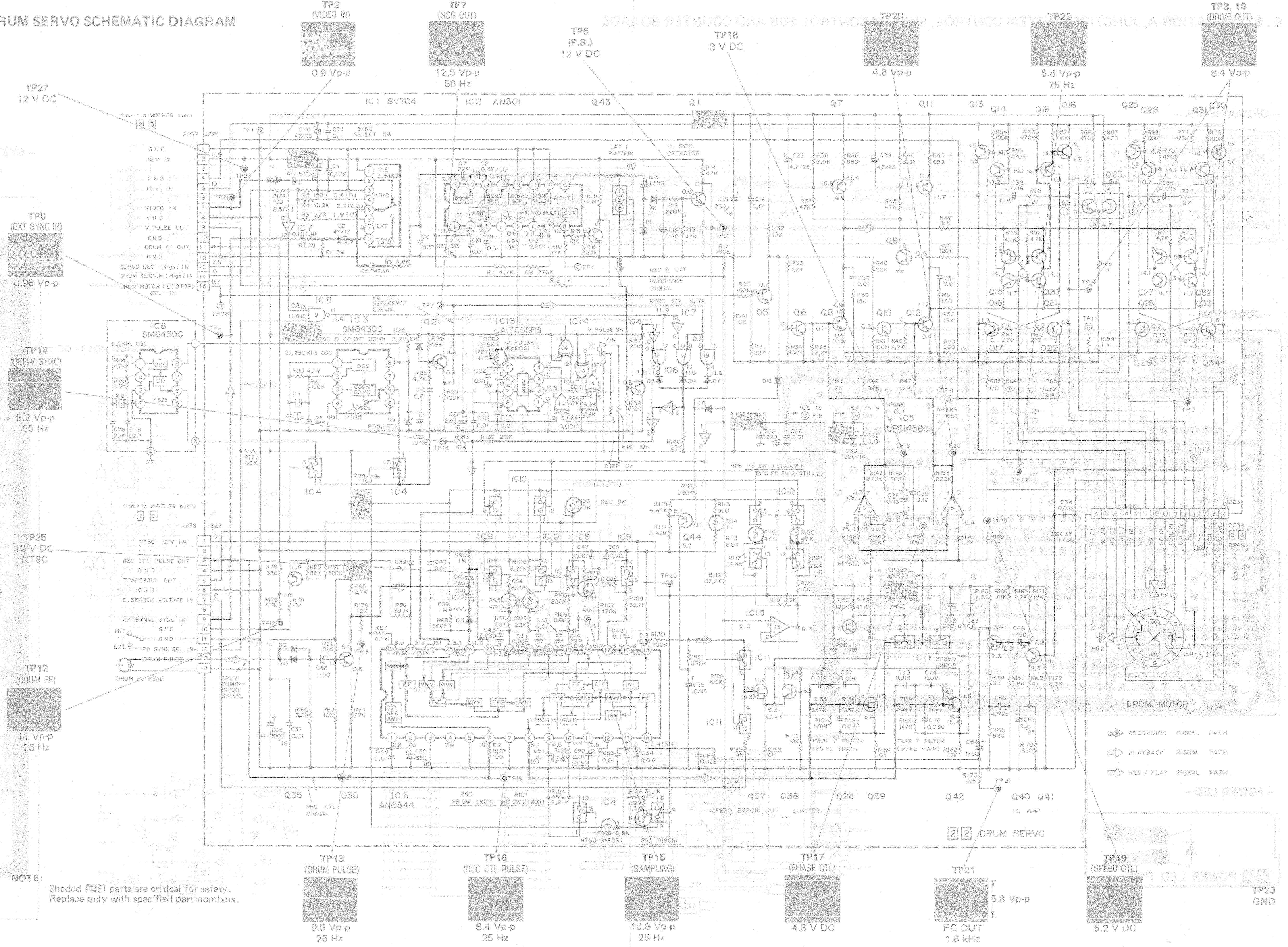
6.10 DRUM SERVO SCHEMATIC DIAGRAM


TP2 (VIDEO IN) 0.9 Vp-p
TP7 (SSG OUT) 12.5 Vp-p 50 Hz
TP5 (P.B.) 12 V DC
TP18 8 V DC
TP27 12 V DC
TP6 (EXT SYNC IN) 0.96 Vp-p
TP14 (REF V SYNC) 5.2 Vp-p 50 Hz
TP25 12 V DC NTSC
TP12 (DRUM FF) 11 Vp-p 25 Hz
TP13 (DRUM PULSE) 9.6 Vp-p 25 Hz
TP16 (REC CTL PULSE) 8.4 Vp-p 25 Hz
TP15 (SAMPLING) 10.6 Vp-p 25 Hz
IC1 8VT04
IC2 AN301
Q43
Q1
from / to MOTHER board 2 3
P237 J221
GND
12V IN
15V IN
VIDEO IN
V. PULSE OUT
DRUM FF OUT
SERVO REC (High) IN
DRUM SEARCH (High) IN
DRUM MOTOR (L: STOP) CTL IN
SYNC SELECT SW
LPF 1 PU4768I
V. SYNC DETECTOR
AMP
SYNC SEP.
V.SYNC SEP.
MONO MULTI
OUT
MONO MULTI
IC7
IC8
IC3 SM6430C
IC6 SM6430C
31.5KHz OSC
31,250 KHz OSC
OSC & COUNT DOWN
COUNT DOWN
PB INT. REFERENCE SIGNAL
Q2
IC13 HA17555PS
V. PULSE (ZEROS)
IC14
V. PULSE SW
REC & EXT REFERENCE SIGNAL
SYNC SEL. GATE
Q4
Q5
IC4
Q24
L6 1mH
IC10
IC9
REC SW
Q44
from / to MOTHER board 2 3
J238 J222
NTSC 12V IN
REC CTL PULSE OUT
TRAPEZOID OUT
D. SEARCH VOLTAGE IN
EXTERNAL SYNC IN
INT.
EXT.
PB SYNC SEL. IN
DRUM PULSE IN
DRUM PG HEAD
DRUM COMPARISON SIGNAL
MMV
FF
CTL REC AMP
TPZ
S/H
GATE
DIF
INV
IC15
IC11
Q35
Q36
REC CTL SIGNAL
IC6 AN6344
R95 PB SW1 (NOR)
R101 PB SW2 (NOR)
NTSC DISCRI
PAL DISCRI
Q37
SPEED ERROR OUT

NOTE:

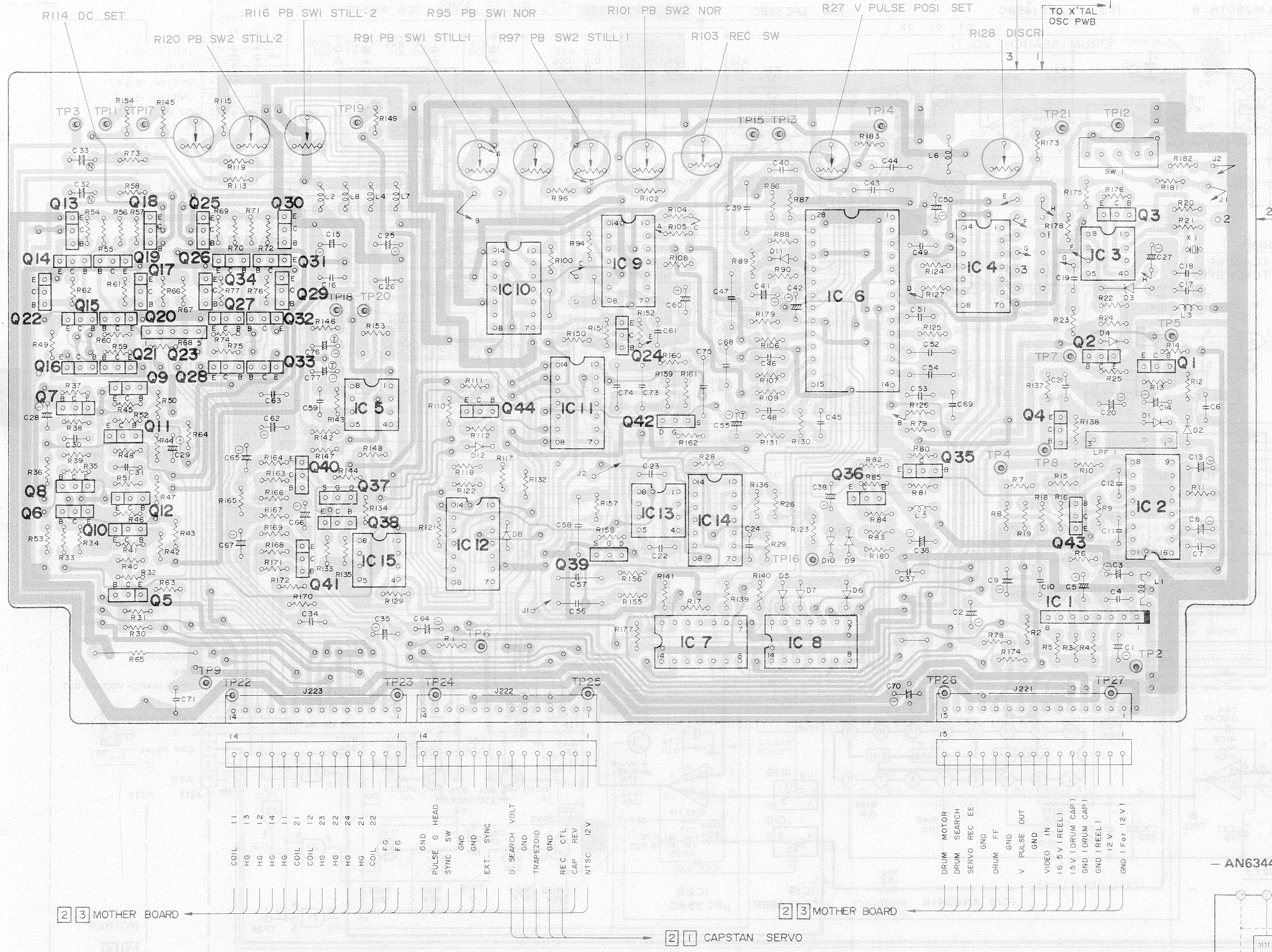
Shaded (▨) parts are critical for safety.
Replace only with specified part numbers.

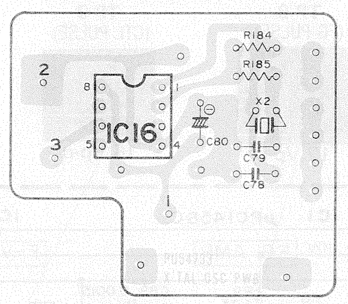
6 . 10 DRUM SERVO SCHEMATIC DIAGRAM


TP2
(VIDEO IN)
0.9 Vp-p
TP7
(SSG OUT)
12,5 Vp-p
50 Hz
TP5
(P.B.)
12 V DC
TP18
8 V DC
TP20
4.8 Vp-p
TP22
8.8 Vp-p
75 Hz
TP3, 10
(DRIVE OUT)
8.4 Vp-p
TP27
12 V DC
TP6
(EXT SYNC IN)
0.96 Vp-p
TP14
(REF V SYNC)
5.2 Vp-p
50 Hz
TP25
12 V DC
NTSC
TP12
(DRUM FF)
11 Vp-p
25 Hz
IC1 8VT04
IC2 AN301
Q43
Q1
Q7
Q11
Q13
Q14
Q19
Q18
Q25
Q26
Q31
Q30
IC6 SM6430C
IC8
IC3 SM6430C
IC7
IC13 HA17555PS
IC14
IC5 UPC1458C
IC4
IC10
IC9
IC12
IC15
IC11
IC6 AN6344
from / to MOTHER board
P237
J221
J222
J238
J223
P239
P240
GND
12 V IN
15 V IN
VIDEO IN
V. PULSE OUT
DRUM FF OUT
SERVO REC (High) IN
DRUM SEARCH (High) IN
DRUM MOTOR (L: STOP) CTL IN
NTSC 12 V IN
REC CTL PULSE OUT
TRAPEZOID OUT
D. SEARCH VOLTAGE IN
EXTERNAL SYNC IN
PB SYNC SEL. IN
DRUM PULSE IN
DRUM PG HEAD
DRUM COMPARISON SIGNAL
SYNC SELECT SW
LPF PU4768I
V. SYNC DETECTOR
REC & EXT REFERENCE SIGNAL
SYNC SEL. GATE
PB INT. REFERENCE SIGNAL
OSC & COUNT DOWN
V. PULSE SW
REC SW
PB SW1 (STILL2)
PB SW2 (STILL2)
PHASE ERROR
SPEED ERROR
NTSC SPEED ERROR
TWIN T FILTER (25 Hz TRAP)
TWIN T FILTER (30 Hz TRAP)
DRIVE OUT
BRAKE OUT
Q35
Q36
REC CTL SIGNAL
PB SW1 (NOR)
PB SW2 (NOR)
NTSC DISCRI
PAL DISCRI
Q37
Q38
Q24
Q39
Q42
Q40
Q41
SPEED ERROR OUT
LIMITER
FG AMP
DRUM MOTOR
HG 1
HG 2
Coil-1
Coil-2
2 2 DRUM SERVO
RECORDING SIGNAL PATH
PLAYBACK SIGNAL PATH
REC / PLAY SIGNAL PATH
TP13
(DRUM PULSE)
9.6 Vp-p
25 Hz
TP16
(REC CTL PULSE)
8.4 Vp-p
25 Hz
TP15
(SAMPLING)
10.6 Vp-p
25 Hz
TP17
(PHASE CTL)
4.8 V DC
TP21
5.8 Vp-p
FG OUT
1.6 kHz
TP19
(SPEED CTL)
5.2 V DC
TP23
GND

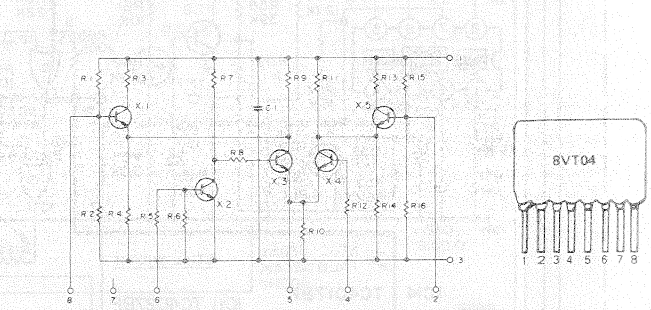
NOTE:
Shaded (▨) parts are critical for safety.
Replace only with specified part nombers.

6.11 DRUM SERVO CIRCUIT BOARD

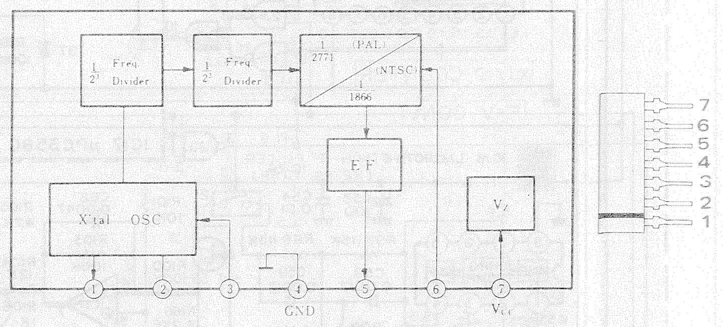

R114 DC SET
R120 PB SW2 STILL-2
R116 PB SW1 STILL-2
R91 PB SW1 STILL-1
R95 PB SW1 NOR
R97 PB SW2 STILL-1
R101 PB SW2 NOR
R103 REC SW
R27 V PULSE POSI SET
R128 DISCRI
TO X'TAL OSC PWB
TO X'TAL OSC PWB
TO X'TAL OSC PWB
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC15
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP18
TP19
TP20
TP21
TP22
TP23
TP24
TP25
TP26
TP27
J221
J222
J223
COIL 11
HG 13
HG 12
HG 14
HG 11
COIL 21
COIL 12
HG 23
HG 22
HG 24
HG 21
COIL 22
FG
FG
GND
PULSE G HEAD
SYNC SW
GND
GND
EXT. SYNC
D. SEARCH VOLT
GND
TRAPEZOID
GND
REC CTL
CAP REV
NTSC 12V
DRUM MOTOR
DRUM SEARCH
SERVO REC EE
GND
DRUM FF
GND
V PULSE OUT
GND
VIDEO IN
16.5V (REEL)
15V (DRUM CAP)
GND (DRUM CAP)
GND (REEL)
12V
GND (For 12V)
2 3 MOTHER BOARD
2 1 CAPSTAN SERVO
2 3 MOTHER BOARD


X'TAL OSC PWB
IC16
X2
R184
R185
C79
C80
C78
2
3
1

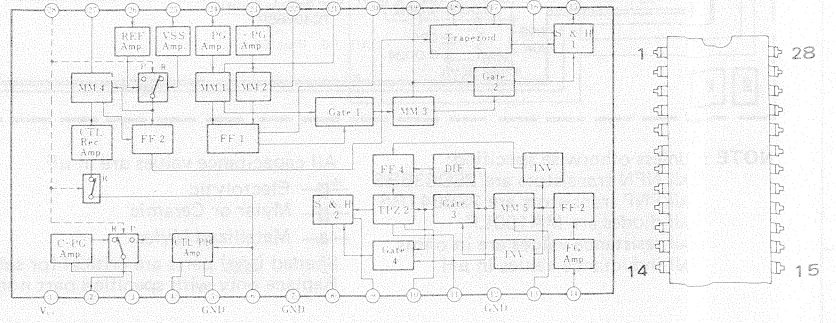
- 8VT04 -


8VT04
1 2 3 4 5 6 7 8

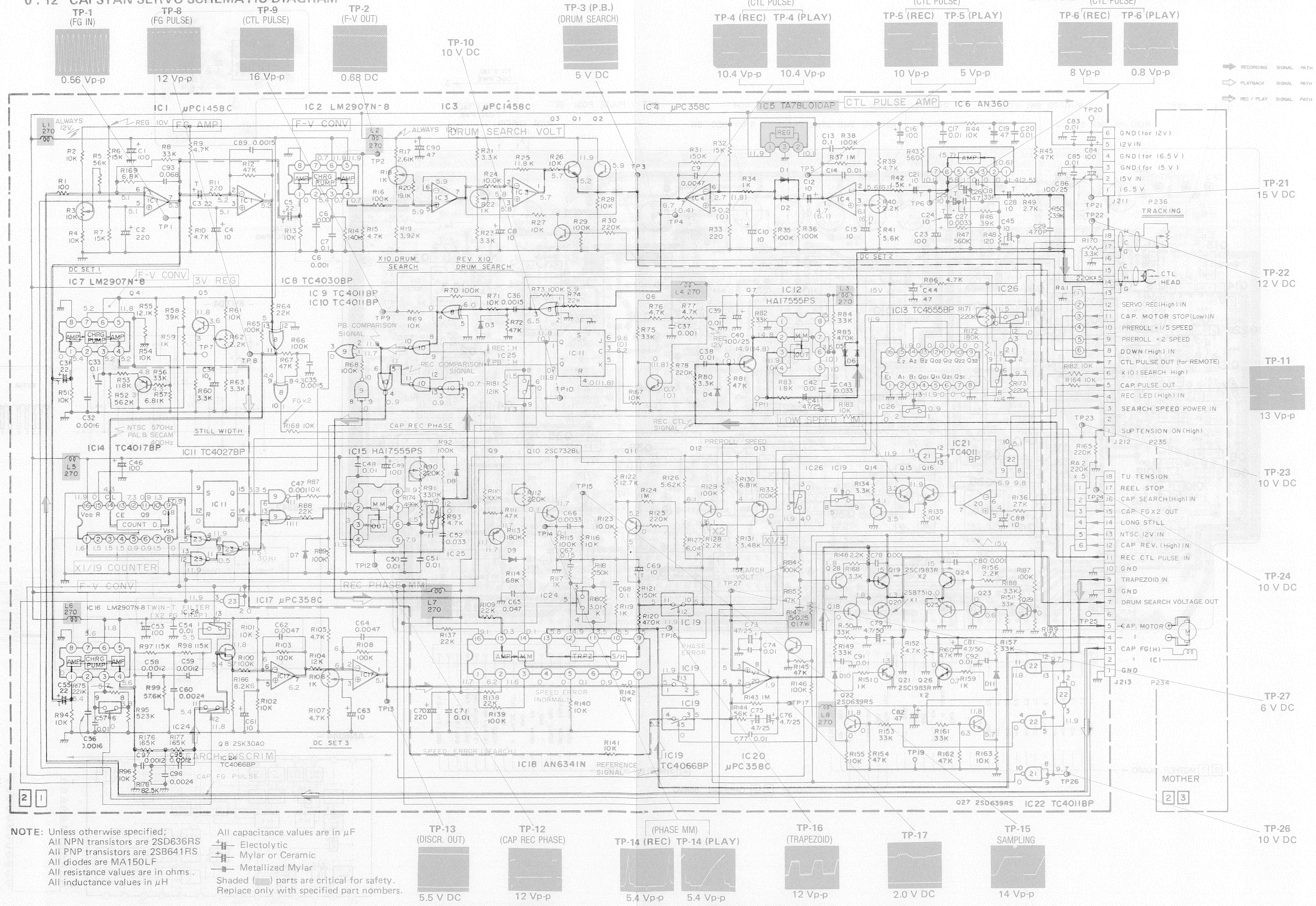
- AN6342 -


1/2^2 Freq Divider
1/2^2 Freq Divider
1/2771 (PAL)
1/1866 (NTSC)
E F
X'tal OSC
V_Z
GND
V_{CC}
1
2
3
4
5
6
7

- AN6344 -


REF Amp
VSS Amp
Trapezoid
MM 4
MM 1
MM 2
MM 3
CTL Rec Amp
FF 2
FF 1
Gate 1
Gate 2
Gate 3
Gate 4
FF 4
DIF
INV
TPZ 2
MM 5
FF 2
C. Tr Amp
CTL PB Amp
Vcc
GND
1
28
14
15

6.12 CAPSTAN SERVO SCHEMATIC DIAGRAM



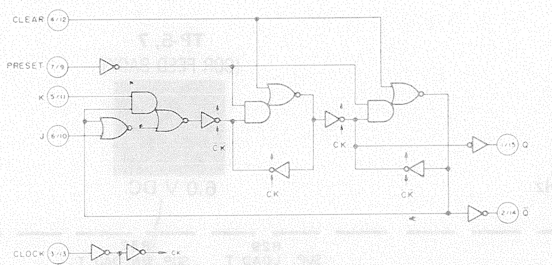
TP-1 (FG IN) 0.56 Vp-p
TP-8 (FG PULSE) 12 Vp-p
TP-9 (CTL PULSE) 16 Vp-p
TP-2 (F-V OUT) 0.68 DC
TP-10 10 V DC
TP-3 (P.B.) (DRUM SEARCH) 5 V DC
(CTL PULSE) TP-4 (REC) 10.4 Vp-p TP-4 (PLAY) 10.4 Vp-p
(CTL PULSE) TP-5 (REC) 10 Vp-p TP-5 (PLAY) 5 Vp-p
(CTL PULSE) TP-6 (REC) 8 Vp-p TP-6 (PLAY) 0.8 Vp-p
RECORDING SIGNAL PATH
PLAYBACK SIGNAL PATH
REC / PLAY SIGNAL PATH
TP-21 15 V DC
TP-22 12 V DC
TP-11 13 Vp-p
TP-23 10 V DC
TP-24 10 V DC
TP-27 6 V DC
TP-26 10 V DC
IC1 μPC1458C
IC2 LM2907N-8
IC3 μPC1458C
IC4 μPC358C
IC5 TA78L010AP
IC6 AN360
IC7 LM2907N-8
IC8 TC4030BP
IC9 TC4011BP
IC10 TC4011BP
IC11 TC4027BP
IC12 HA17555PS
IC13 TC4555BP
IC14 TC4017BP
IC15 HA17555PS
IC16 LM2907N-8
IC17 μPC358C
IC18 AN6341N
IC19 TC4066BP
IC20 μPC358C
IC21 TC4011BP
IC22 TC4011BP
IC24 TC4066BP
FG AMP
F-V CONV
DRUM SEARCH VOLT
CTL PULSE AMP
3V REG
X1/19 COUNTER
STILL WIDTH
TWIN-T FILTER (X2 FG TRAP)
SEARCH DISCRIM
CAP FG PULSE
REC PHASE MM
CAP REC PHASE
PB COMPARISON SIGNAL
REC COMPARISON SIGNAL
REC CTL SIGNAL
PREROLL SPEED
LOW SPEED MM
SEARCH VOLT
PHASE ERROR
SPEED ERROR (NORMAL)
SPEED ERROR (SEARCH)
REFERENCE SIGNAL
X10 DRUM SEARCH
REV X10 DRUM SEARCH
DC SET 1
DC SET 2
DC SET 3
NTSC 570Hz PAL & SECAM 400Hz
ALWAYS 12V
REG 10V
P236 TRACKING
CTL HEAD
J211
GND (for 12V)
12V IN
GND (for 16.5V)
GND (for 15V)
15V IN
16.5V
J212 P235
SERVO REC (High) IN
CAP. MOTOR STOP (Low) IN
PREROLL ×1/5 SPEED
PREROLL ×2 SPEED
DOWN (High) IN
CTL PULSE OUT (for REMOTE)
X10 (SEARCH High)
CAP PULSE OUT
REC LED (High) IN
SEARCH SPEED POWER IN
SUP TENSION ON (High)
J213 P234
TU TENSION
REEL STOP
CAP SEARCH (High) IN
CAP FG X2 OUT
LONG STILL
NTSC 12V IN
CAP REV. (High) IN
REC CTL PULSE IN
GND
TRAPEZOID IN
GND
DRUM SEARCH VOLTAGE OUT
CAP. MOTOR
CAP FG (H)
(C)
GND
MOTHER
2 3
2 1
Q8 2SK30A0
Q10 2SC732BL
Q27 2SD639RS
TP-13 (DISCR. OUT) 5.5 V DC
TP-12 (CAP REC PHASE) 12 Vp-p
(PHASE MM) TP-14 (REC) 5.4 Vp-p TP-14 (PLAY) 5.4 Vp-p
TP-16 (TRAPEZOID) 12 Vp-p
TP-17 2.0 V DC
TP-15 SAMPLING 14 Vp-p

NOTE: Unless otherwise specified;
All NPN transistors are 2SD636RS
All PNP transistors are 2SB641RS
All diodes are MA150LF
All resistance values are in ohms.
All inductance values in μH

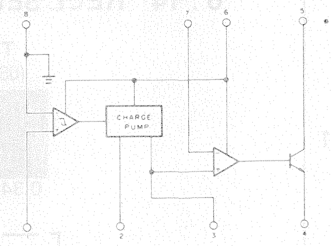
All capacitance values are in μF
Electolytic
Mylar or Ceramic
Metallized Mylar
Shaded (▨) parts are critical for safety.
Replace only with specified part nombers.

6.13 CAPSTAN SERVO CIRCUIT BOARD

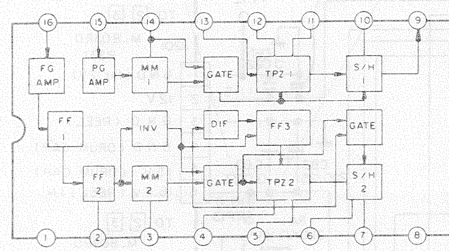
– TC-4027BP –


CLEAR
PRESET
K
J
CK
CLOCK
Q

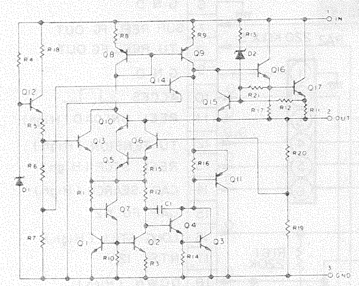
– LM2907N-8 –

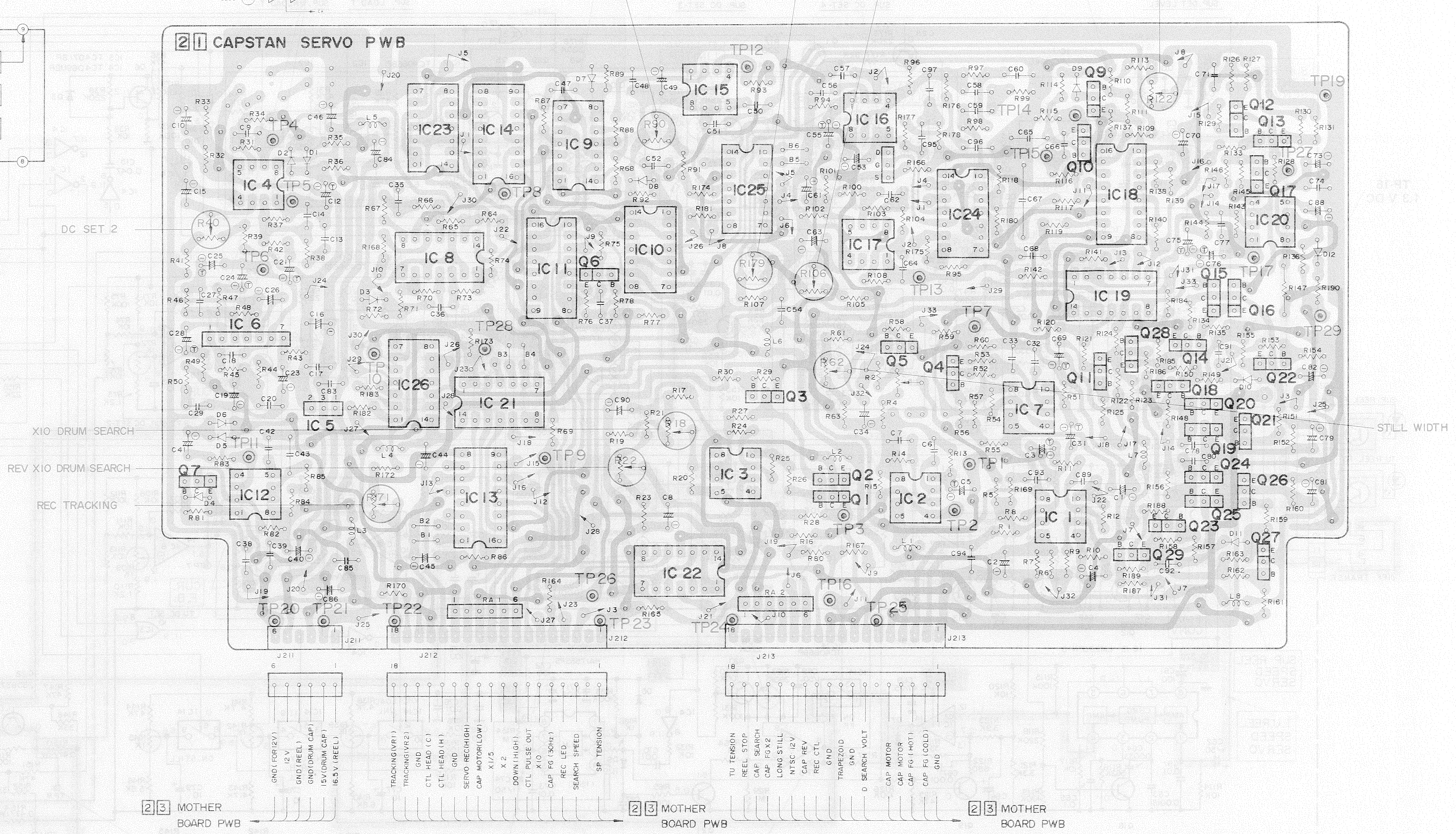

CHARGE PUMP

– AN6341N –

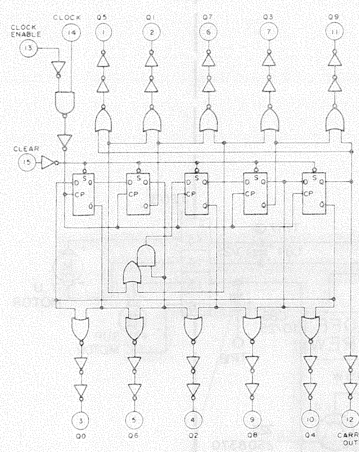

FG AMP
PG AMP
MM 1
GATE
TP2 1
S/H 1
FF 1
INV
DIF
FF3
GATE
FF 2
MM 2
GATE
TP2 2
S/H 2

– UPC87M10H –

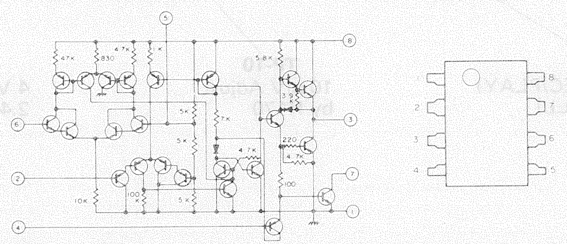



CAP REC PHASE
DC SET 3 PAL
DC SET 3
SUB TRACKING ADJ
2 1 CAPSTAN SERVO PWB
DC SET 2
XIO DRUM SEARCH
REV XIO DRUM SEARCH
REC TRACKING
STILL WIDTH
J211
J212
J213
GND (FOR 12V)
12 V
GND (REEL)
GND (DRUM CAP)
15V (DRUM CAP)
16.5V (REEL)
TRACKING (VR1)
TRACKING (VR2)
GND
CTL HEAD (C)
CTL HEAD (H)
GND
SERVO REC (HIGH)
CAP MOTOR (LOW)
X1/5
X2
DOWN (HIGH)
CTL PULSE OUT
X10
CAP FG (30Hz)
REC LED
SEARCH SPEED
SP TENSION
TU TENSION
REEL STOP
CAP SEARCH
CAP FG X2
LONG STILL
NTSC 12V
CAP REV
REC CTL
GND
TRAPEZOID
GND
D SEARCH VOLT
CAP MOTOR
CAP MOTOR
CAP FG (HOT)
CAP FG (COLD)
GND
2 3 MOTHER BOARD PWB
2 3 MOTHER BOARD PWB
2 3 MOTHER BOARD PWB

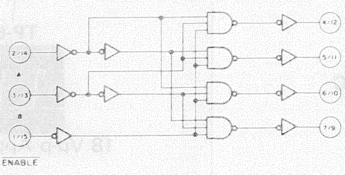
– TC4017BP –


CLOCK ENABLE
CLOCK
CLEAR
CARRY OUT

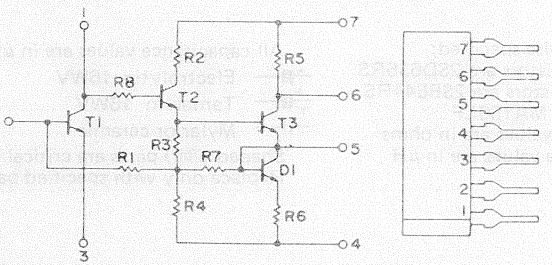
– HA17555PS –



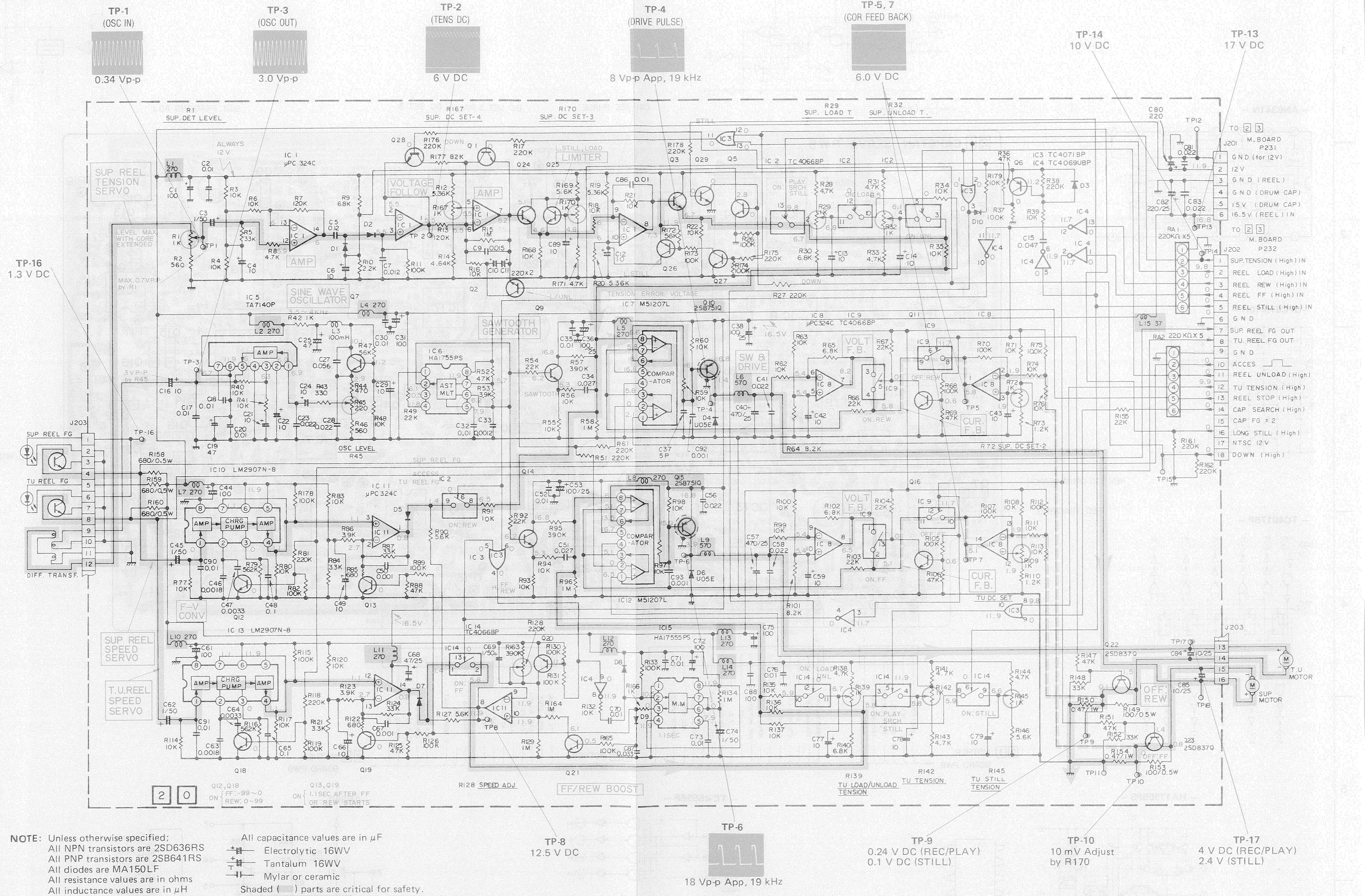
– TC-4555BP –


ENABLE
Q0
Q1
Q2
Q3

– AN360 –


R2
R5
R8
T1
T2
T3
R1
R3
R7
D1
R4
R6

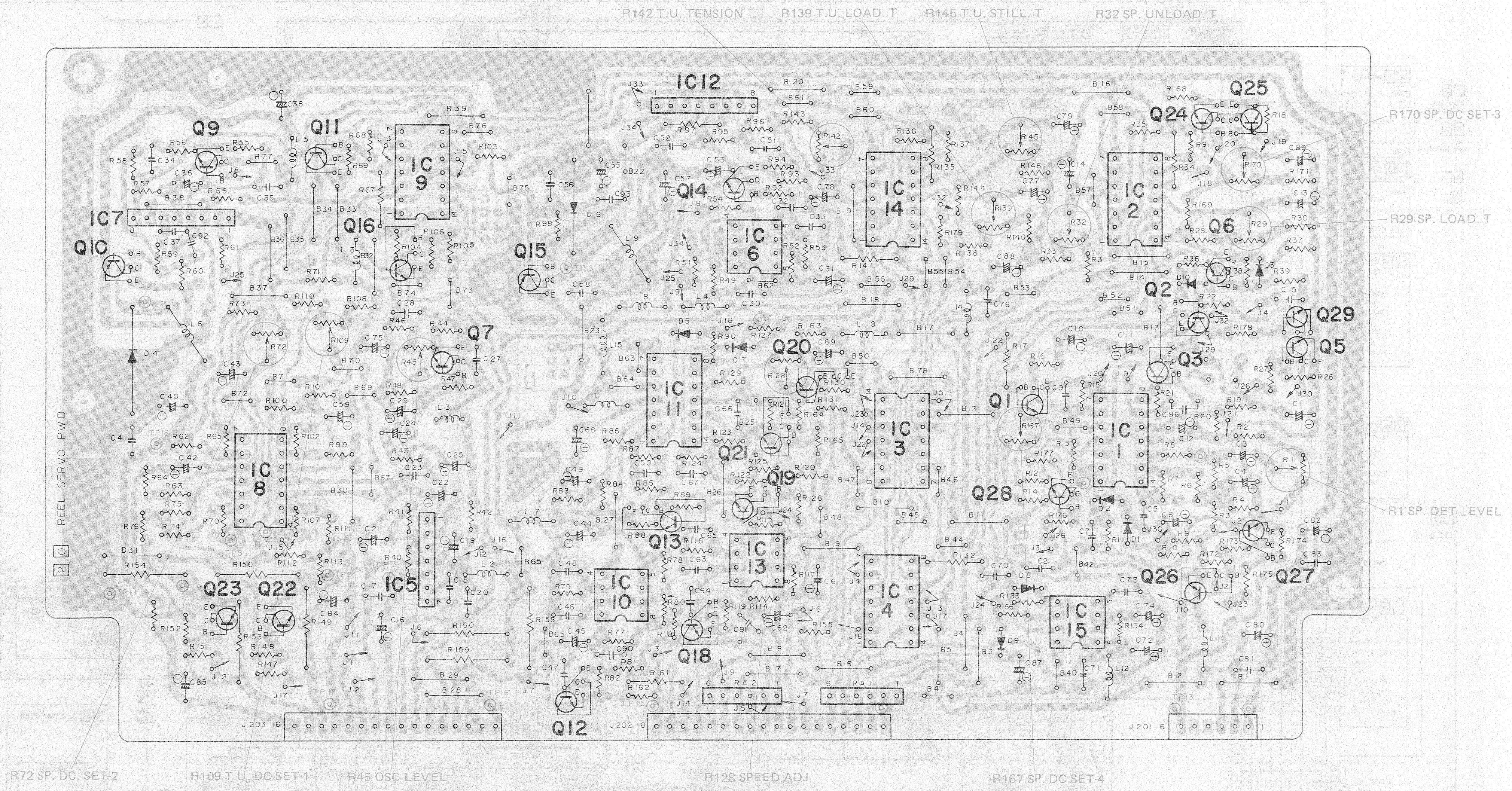
6.14 REEL SERVO SCHEMATIC DIAGRAM


TP-1
(OSC IN)
0.34 Vp-p
TP-3
(OSC OUT)
3.0 Vp-p
TP-2
(TENS DC)
6 V DC
TP-4
(DRIVE PULSE)
8 Vp-p App, 19 kHz
TP-5, 7
(COR FEED BACK)
6.0 V DC
TP-14
10 V DC
TP-13
17 V DC
TP-16
1.3 V DC
SUP REEL TENSION SERVO
SINE WAVE OSCILLATOR
VOLTAGE FOLLOW
AMP
LIMITER
SAWTOOTH GENERATOR
SW & DRIVE
VOLT F.B.
CUR. F.B.
F-V CONV
SUP REEL SPEED SERVO
T.U.REEL SPEED SERVO
FF/REW BOOST
OFF: REW
TENSION ERROR VOLTAGE
R1 SUP. DET LEVEL
R167 SUP. DC SET-4
R170 SUP. DC SET-3
R29 SUP. LOAD T
R32 SUP. UNLOAD T.
R45 OSC LEVEL
R72 SUP. DC SET-2
R128 SPEED ADJ
R139 TU LOAD/UNLOAD TENSION
R142 TU TENSION
R145 TU STILL TENSION
IC1 μPC 324C
IC2 TC4066BP
IC3 TC4071BP
IC4 TC4069UBP
IC5 TA7140P
IC6 HA1755PS
IC7 M51207L
IC8 μPC324C
IC9 TC4066BP
IC10 LM2907N-8
IC11 μPC 324C
IC12 M51207L
IC13 LM2907N-8
IC14 TC4066BP
IC15 HA17555PS
J201
TO [2] [3] M. BOARD P231
1 GND (for 12V)
2 12 V
3 GND (REEL)
4 GND (DRUM CAP)
5 15 V (DRUM CAP)
6 16.5 V (REEL) IN
TO [2] [3] M. BOARD P232
J202
1 SUP. TENSION (High) IN
2 REEL LOAD (High) IN
3 REEL REW (High) IN
4 REEL FF (High) IN
5 REEL STILL (High) IN
6 GND
7 SUP. REEL FG OUT
8 TU. REEL FG OUT
9 GND
10 ACCES
11 REEL UNLOAD (High)
12 TU TENSION (High)
13 REEL STOP (High)
14 CAP SEARCH (High)
15 CAP FG x 2
16 LONG STILL (High)
17 NTSC 12 V
18 DOWN (High)
J203
SUP REEL FG
TU REEL FG
DIFF. TRANSF.
T.U MOTOR
SUP MOTOR
Q12, Q18 ON: FF: -99~0 REW: 0~99
Q13, Q19 ON: 1.1SEC AFTER FF OR REW STARTS
TP-8
12.5 V DC
TP-6
18 Vp-p App, 19 kHz
TP-9
0.24 V DC (REC/PLAY)
0.1 V DC (STILL)
TP-10
10 mV Adjust by R170
TP-17
4 V DC (REC/PLAY)
2.4 V (STILL)

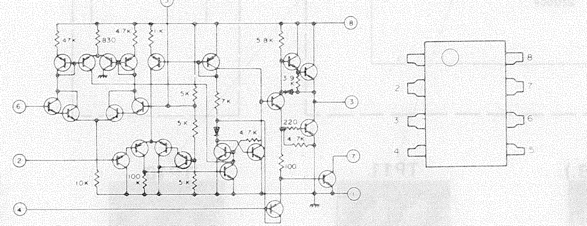
NOTE: Unless otherwise specified;
All NPN transistors are 2SD636RS
All PNP transistors are 2SB641RS
All diodes are MA150LF
All resistance values are in ohms
All inductance values are in μH

All capacitance values are in μF
Electrolytic 16WV
Tantalum 16WV
Mylar or ceramic
Shaded ( ) parts are critical for safety.
Replace only with specified part nombers.

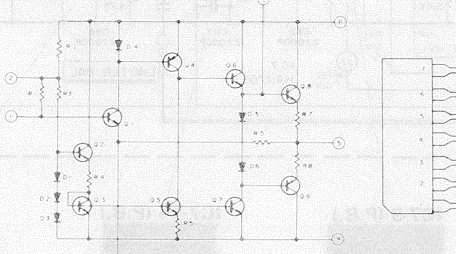
6 . 15 REEL SERVO CIRCUIT BOARD


R142 T.U. TENSION
R139 T.U. LOAD. T
R145 T.U. STILL. T
R32 SP. UNLOAD. T
R170 SP. DC SET-3
R29 SP. LOAD. T
R1 SP. DET LEVEL
R72 SP. DC. SET-2
R109 T.U. DC SET-1
R45 OSC LEVEL
R128 SPEED ADJ
R167 SP. DC SET-4
REEL SERVO PWB
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC15
Q1
Q2
Q3
Q5
Q6
Q7
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
Q26
Q27
Q28
Q29
J201
J202
J203

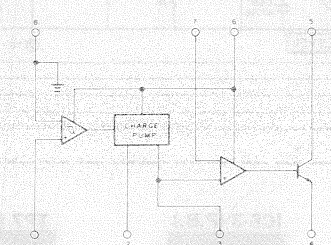
– HA17555PS –



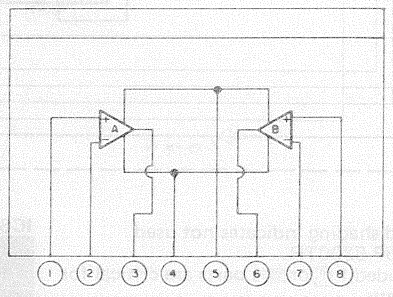
– TA7140P –



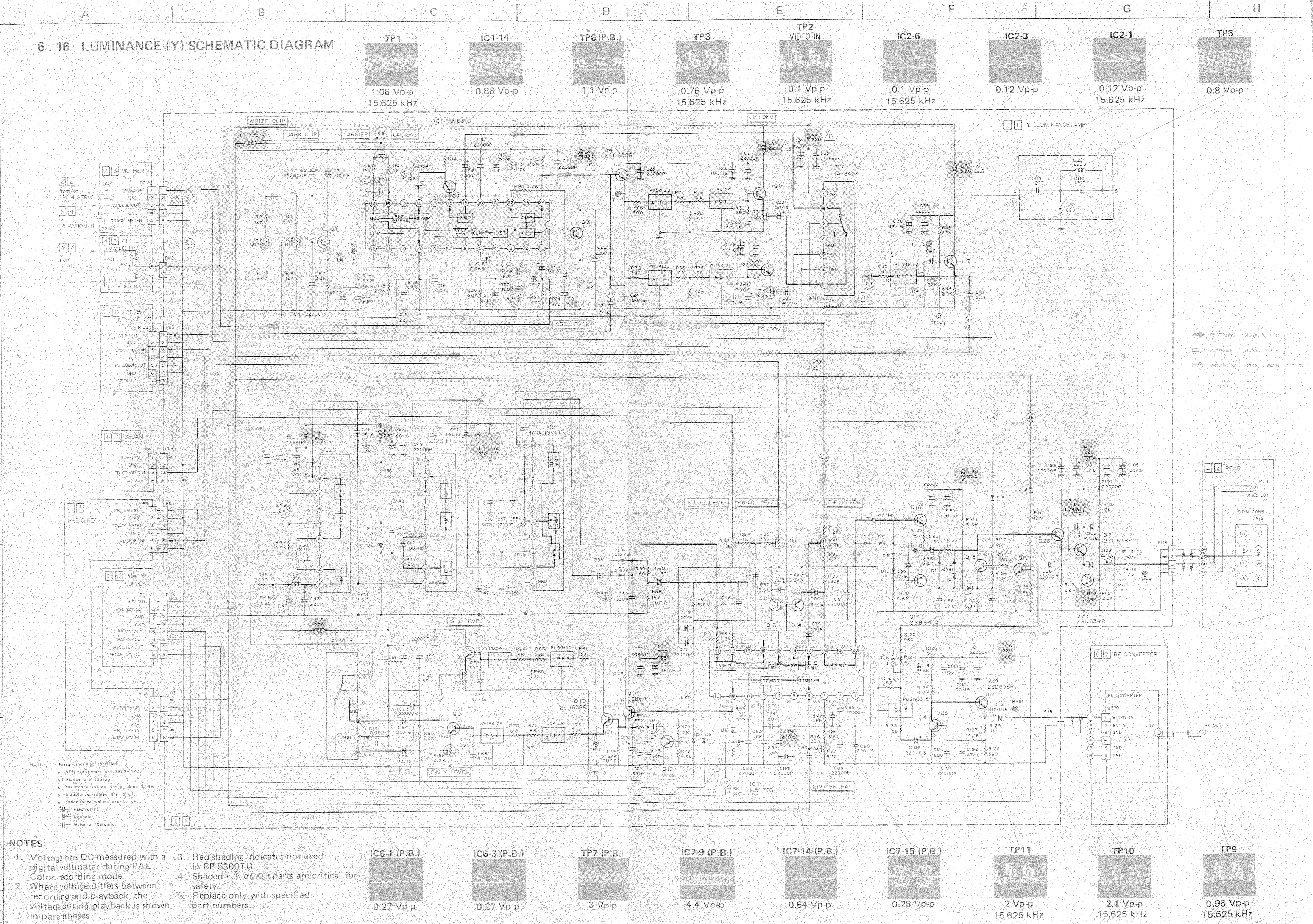
– LM2907N-8 –



– M51207L –


A
B
1
2
3
4
5
6
7
8

6.16 LUMINANCE (Y) SCHEMATIC DIAGRAM

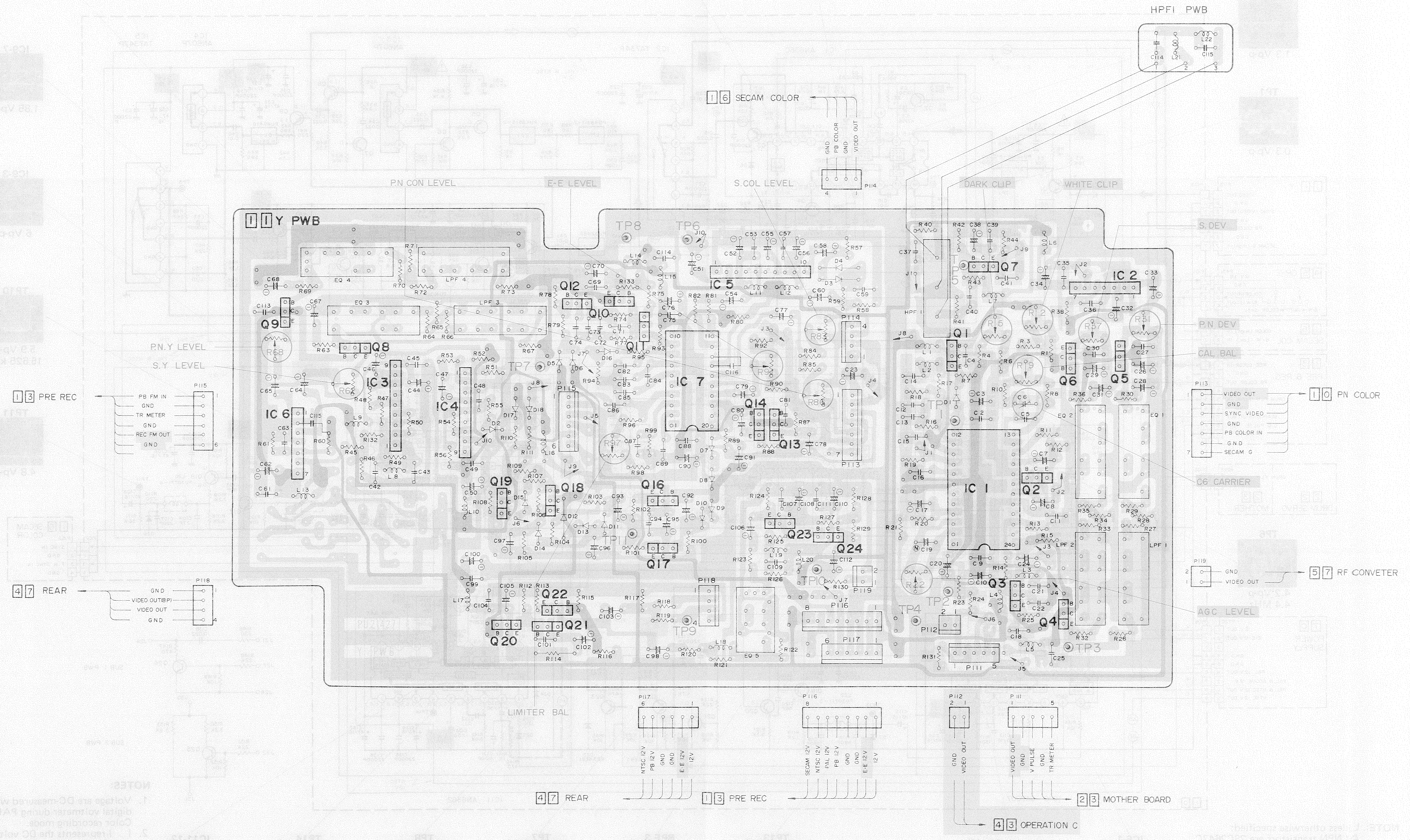

TP1
1.06 Vp-p
15.625 kHz
IC1-14
0.88 Vp-p
TP6 (P.B.)
1.1 Vp-p
TP3
0.76 Vp-p
15.625 kHz
TP2
VIDEO IN
0.4 Vp-p
15.625 kHz
IC2-6
0.1 Vp-p
15.625 kHz
IC2-3
0.12 Vp-p
IC2-1
0.12 Vp-p
15.625 kHz
TP5
0.8 Vp-p
IC1 AN6310
IC2 TA7347P
IC3 VC2011
IC4 VC2011
IC5 10VT13
IC6 TA7347P
IC7 HA11703
Y (LUMINANCE) AMP
WHITE CLIP
DARK CLIP
CARRIER
CAL BAL
AGC LEVEL
P. DEV
S. DEV
S. COL. LEVEL
P.N. COL. LEVEL
E.E. LEVEL
S. Y. LEVEL
P.N. Y. LEVEL
LIMITER BAL
MOTHER
from/to DRUM SERVO
to OPERATION-B
OP-C
from REAR
PAL & NTSC COLOR
SECAM COLOR
PRE & REC
POWER SUPPLY
REAR
RF CONVERTER
RECORDING SIGNAL PATH
PLAYBACK SIGNAL PATH
REC / PLAY SIGNAL PATH
IC6-1 (P.B.)
0.27 Vp-p
IC6-3 (P.B.)
0.27 Vp-p
TP7 (P.B.)
3 Vp-p
IC7-9 (P.B.)
4.4 Vp-p
IC7-14 (P.B.)
0.64 Vp-p
IC7-15 (P.B.)
0.26 Vp-p
TP11
2 Vp-p
15.625 kHz
TP10
2.1 Vp-p
15.625 kHz
TP9
0.96 Vp-p
15.625 kHz

NOTE ; Unless otherwise specified ;
All NPN transistors are 2SC2647C.
All diodes are 1SS133.
All resistance values are in ohms 1/6W.
All inductance values are in μH.
All capacitance values are in μF.
Electrolytic.
Nonpolar.
Mylar or Ceramic.

NOTES:

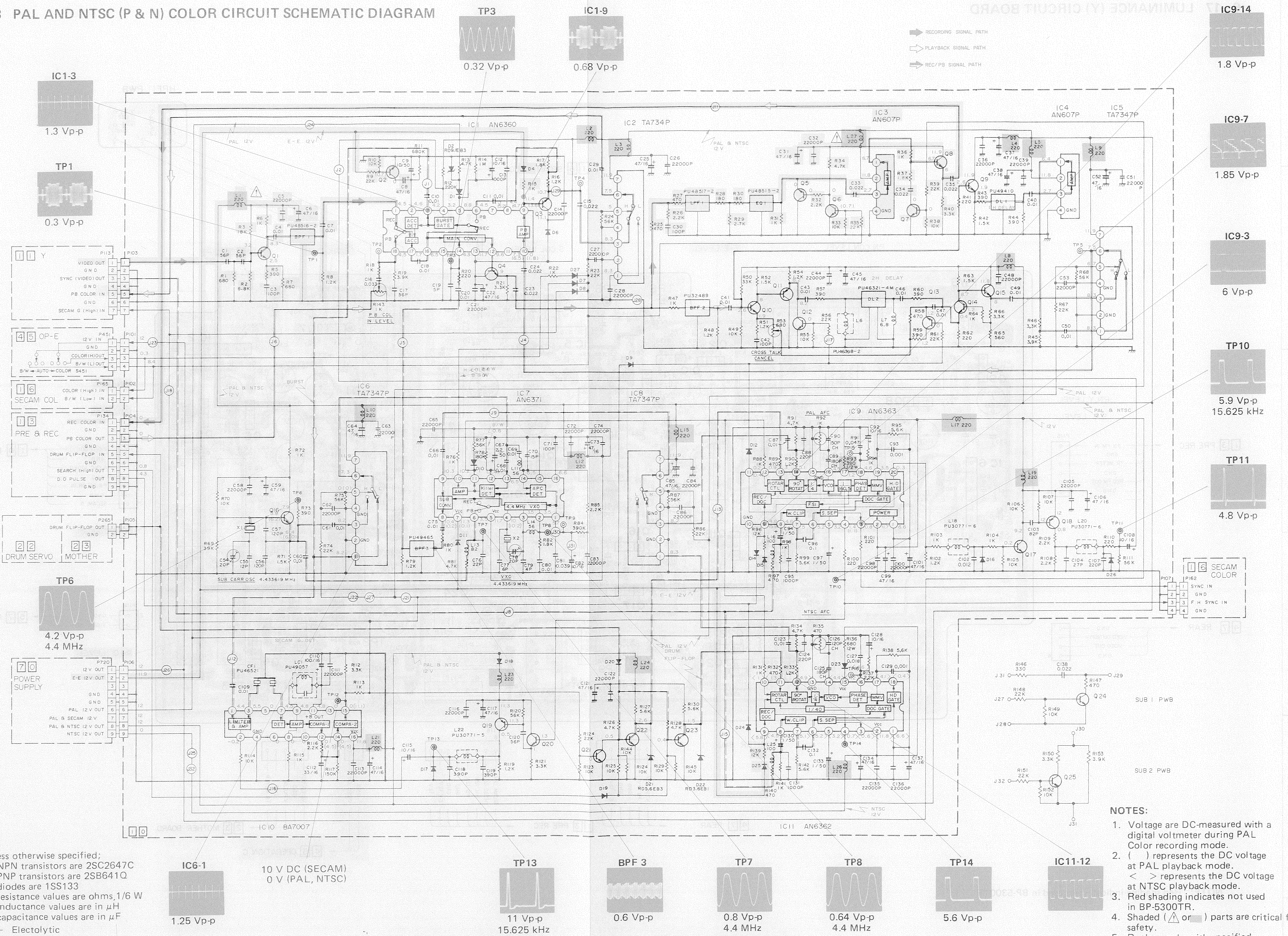
1. Voltage are DC-measured with a digital voltmeter during PAL Color recording mode.
2. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.
3. Red shading indicates not used in BP-5300TR.
4. Shaded (⚠ or ▨) parts are critical for safety.
5. Replace only with specified part numbers.

6 . 17 LUMINANCE (Y) CIRCUIT BOARD


HPFI PWB
C114
L21
L22
C115
1 6 SECAM COLOR
GND
PB COLOR
GND
VIDEO OUT
P114
P.N CON LEVEL
E-E LEVEL
S.COL LEVEL
DARK CLIP
WHITE CLIP
S. DEV
1 1 Y PWB
TP8
TP6
TP5
TP7
TP1
TP2
TP3
TP4
TP9
TP10
IC 1
IC 2
IC 3
IC 4
IC 5
IC 6
IC 7
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
EQ 4
LPF 4
EQ 3
LPF 3
EQ 5
EQ 2
EQ 1
LPF 1
LPF 2
HPF 1
P.N.Y LEVEL
S.Y LEVEL
P.N DEV
CAL BAL
C6 CARRIER
AGC LEVEL
1 3 PRE REC
P115
PB FM IN
GND
TR METER
GND
REC FM OUT
GND
P113
VIDEO OUT
GND
SYNC VIDEO
GND
PB COLOR IN
GND
SECAM G
1 0 PN COLOR
4 7 REAR
P118
GND
VIDEO OUT(P)
VIDEO OUT
GND
P119
GND
VIDEO OUT
5 7 RF CONVETER
P116
P117
P112
P111
LIMITER BAL
P117
NTSC 12V
PB 12V
GND
GND
E-E 12V
4 7 REAR
P116
SECAM 12V
NTSC 12V
PAL 12V
PB 12V
GND
GND
E-E 12V
1 3 PRE REC
P112
GND
VIDEO OUT
4 3 OPERATION C
P111
VIDEO OUT
GND
V PULSE
GND
TR METER
2 3 MOTHER BOARD

NOTE: Red shading indicates not used in BP-5300TR.

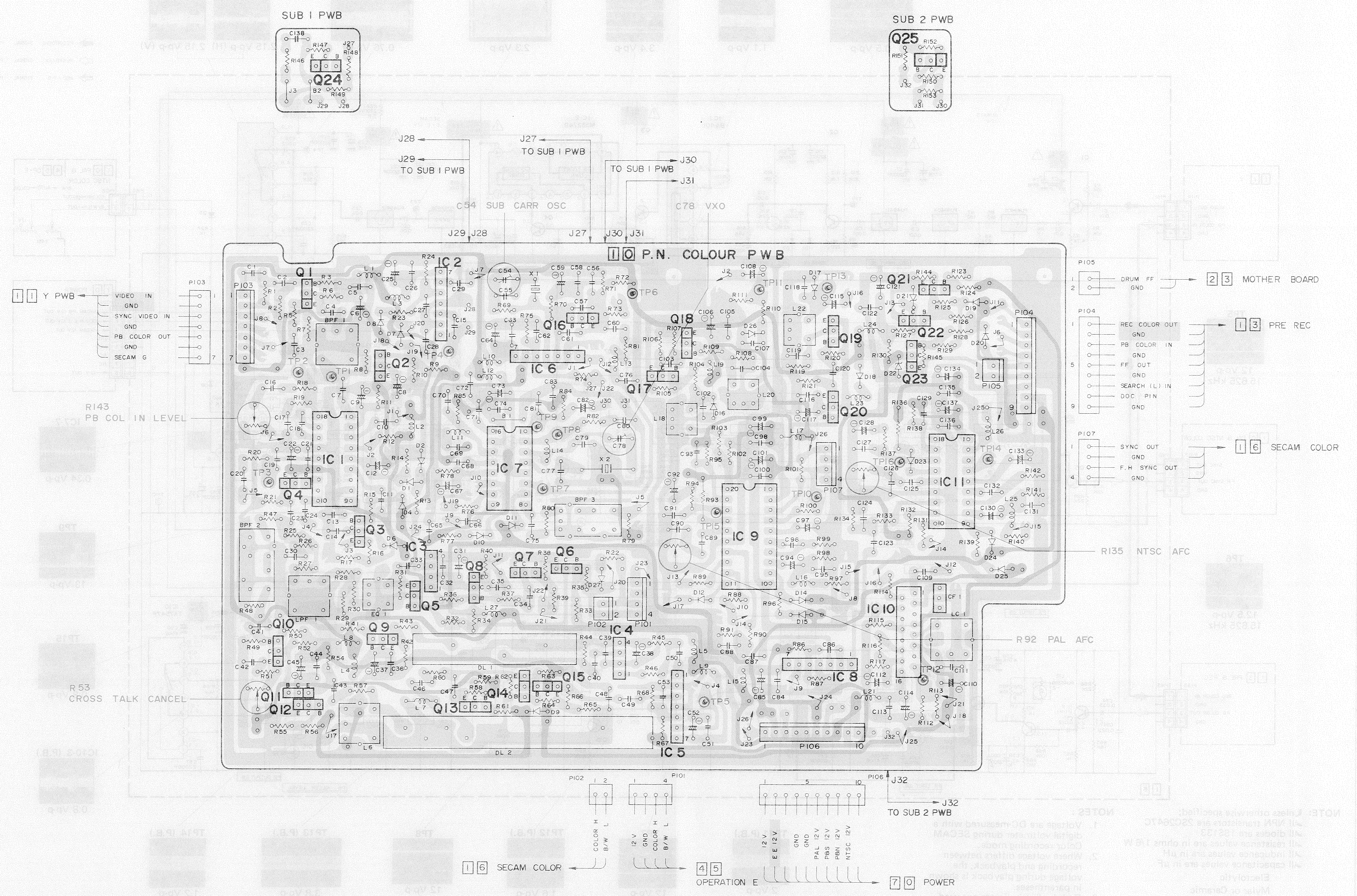
6.18 PAL AND NTSC (P & N) COLOR CIRCUIT SCHEMATIC DIAGRAM


TP3
0.32 Vp-p
IC1-9
0.68 Vp-p
IC9-14
1.8 Vp-p
IC1-3
1.3 Vp-p
TP1
0.3 Vp-p
IC9-7
1.85 Vp-p
IC9-3
6 Vp-p
TP10
5.9 Vp-p
15.625 kHz
TP11
4.8 Vp-p
TP6
4.2 Vp-p
4.4 MHz
IC6-1
1.25 Vp-p
10 V DC (SECAM)
0 V (PAL, NTSC)
TP13
11 Vp-p
15.625 kHz
BPF 3
0.6 Vp-p
TP7
0.8 Vp-p
4.4 MHz
TP8
0.64 Vp-p
4.4 MHz
TP14
5.6 Vp-p
IC11-12
RECORDING SIGNAL PATH
PLAYBACK SIGNAL PATH
REC/PB SIGNAL PATH
IC1 AN6360
IC2 TA734P
IC3 AN607P
IC4 AN607P
IC5 TA7347P
IC6 TA7347P
IC7 AN6371
IC8 TA7347P
IC9 AN6363
IC10 BA7007
IC11 AN6362
Y
OP-E
SECAM COL
PRE & REC
DRUM SERVO
MOTHER
POWER SUPPLY
SECAM COLOR
SUB 1 PWB
SUB 2 PWB
SUB CARR. OSC 4.433619 MHz
VXO 4.433619 MHz
2H DELAY
CROSS TALK CANCEL
PAL AFC
NTSC AFC

NOTE: Unless otherwise specified;
All NPN transistors are 2SC2647C
All PNP transistors are 2SB641Q
All diodes are 1SS133
All resistance values are ohms, 1/6 W
All inductance values are in μH
All capacitance values are in μF
⊣⊢ Electolytic
⊣⊢ Mylar or Ceramic

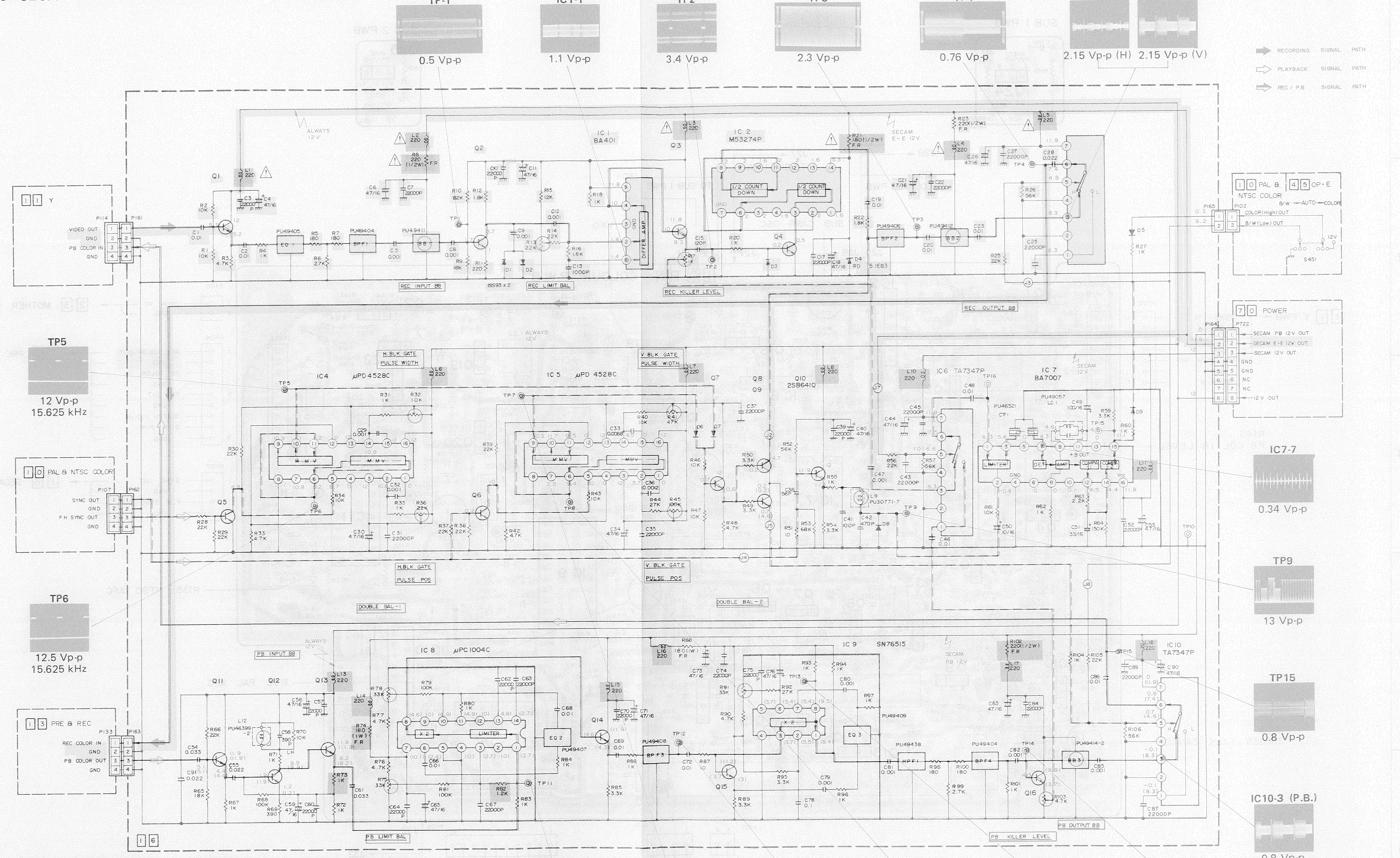
NOTES:
1. Voltage are DC-measured with a digital voltmeter during PAL Color recording mode.
2. ( ) represents the DC voltage at PAL playback mode. < > represents the DC voltage at NTSC playback mode.
3. Red shading indicates not used in BP-5300TR.
4. Shaded (⚠ or ▨) parts are critical for safety.
5. Replace only with specified part numbers.

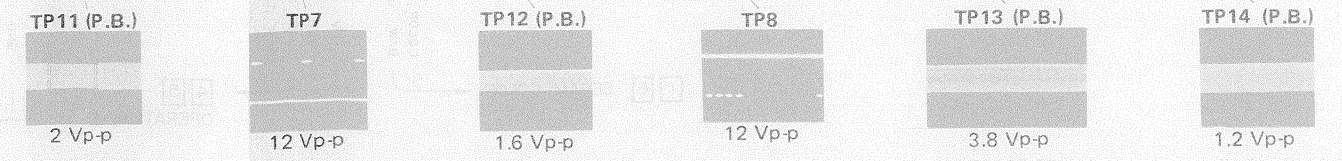
6 . 19 PAL AND NTSC (P & N) COLOR CIRCUIT BOARD


SUB I PWB
Q24
SUB 2 PWB
Q25
J28
J29
TO SUB I PWB
J27
TO SUB I PWB
TO SUB I PWB
J30
J31
C54 SUB CARR OSC
C78 VXO
J29 J28
J27
J30 J31
I O P.N. COLOUR PWB
I I Y PWB
VIDEO IN
GND
SYNC VIDEO IN
GND
PB COLOR OUT
GND
SECAM G
P103
R143
PB COL IN LEVEL
R53
CROSS TALK CANCEL
IC 1
IC 2
IC 3
IC 4
IC 5
IC 6
IC 7
IC 8
IC 9
IC 10
IC 11
DL 1
DL 2
P105
DRUM FF
GND
2 3 MOTHER BOARD
P104
REC COLOR OUT
GND
PB COLOR IN
GND
FF OUT
GND
SEARCH (L) IN
DOC PIN
GND
I 3 PRE REC
P107
SYNC OUT
GND
F.H SYNC OUT
GND
I 6 SECAM COLOR
R135 NTSC AFC
R92 PAL AFC
P102
P101
P106
J32
TO SUB 2 PWB
COLOR H
B/W L
12 V
GND
COLOR H
B/W L
I 6 SECAM COLOR
4 5
OPERATION E
12 V
E.E 12 V
GND
GND
PAL 12 V
PBS 12 V
PBN 12 V
NTSC
7 0 POWER

NOTE: Red shading indicates not used in BP-5300TR.

6 . 20 SECAM COLOR CIRCUIT SCHEMATIC DIAGRAM

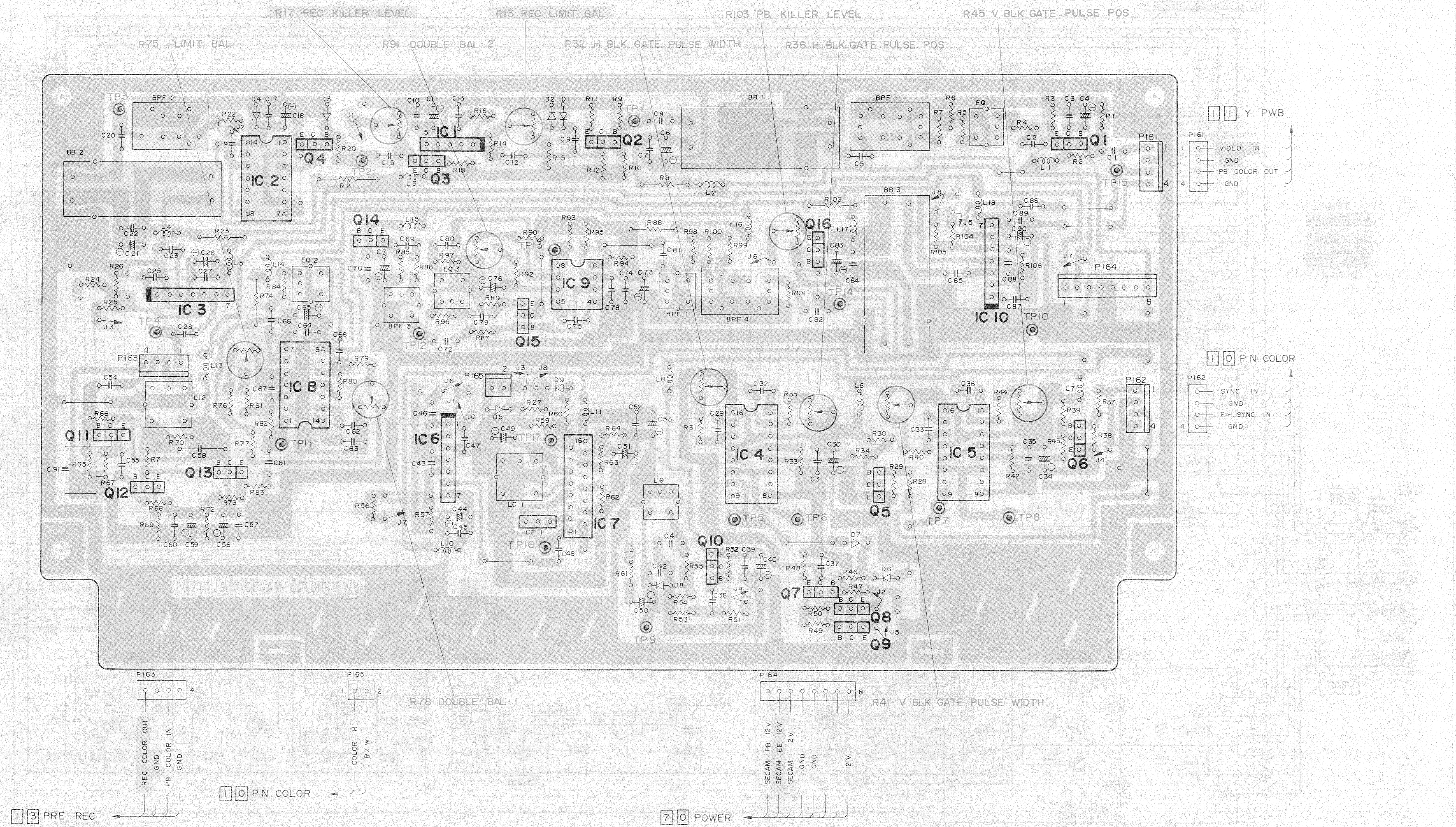

TP-1 0.5 Vp-p
IC1-1 1.1 Vp-p
TP2 3.4 Vp-p
TP3 2.3 Vp-p
TP4 0.76 Vp-p
IC3-3 2.15 Vp-p (H)
IC3-3 2.15 Vp-p (V)
RECORDING SIGNAL PATH
PLAYBACK SIGNAL PATH
REC / P.B SIGNAL PATH
TP5 12 Vp-p 15.625 kHz
TP6 12.5 Vp-p 15.625 kHz
IC7-7 0.34 Vp-p
TP9 13 Vp-p
TP15 0.8 Vp-p
IC10-3 (P.B.) 0.8 Vp-p
IC 1 BA401
IC 2 M53274P
IC4 μPD 4528C
IC 5 μPD 4528C
IC6 TA7347P
IC 7 BA7007
IC 8 μPC1004C
IC 9 SN76515
IC 10 TA7347P
1 1 Y
1 0 PAL & NTSC COLOR
1 3 PRE & REC
1 0 PAL & NTSC COLOR
7 0 POWER
1 6
REC INPUT BB
REC LIMIT BAL
REC KILLER LEVEL
REC OUTPUT BB
H.BLK GATE PULSE WIDTH
V.BLK GATE PULSE WIDTH
H.BLK GATE PULSE POS
V.BLK GATE PULSE POS
DOUBLE BAL-1
DOUBLE BAL-2
PB INPUT BB
PB LIMIT BAL
PB KILLER LEVEL
PB OUTPUT BB



NOTE: Unless otherwise specified;
All NPN transistors are 2SC2647C
All diodes are 1SS133
All resistance values are in ohms 1/6 W
All inducance values are in μH
All capacitance values are in μF
Electolytic
Mylar or Ceramic

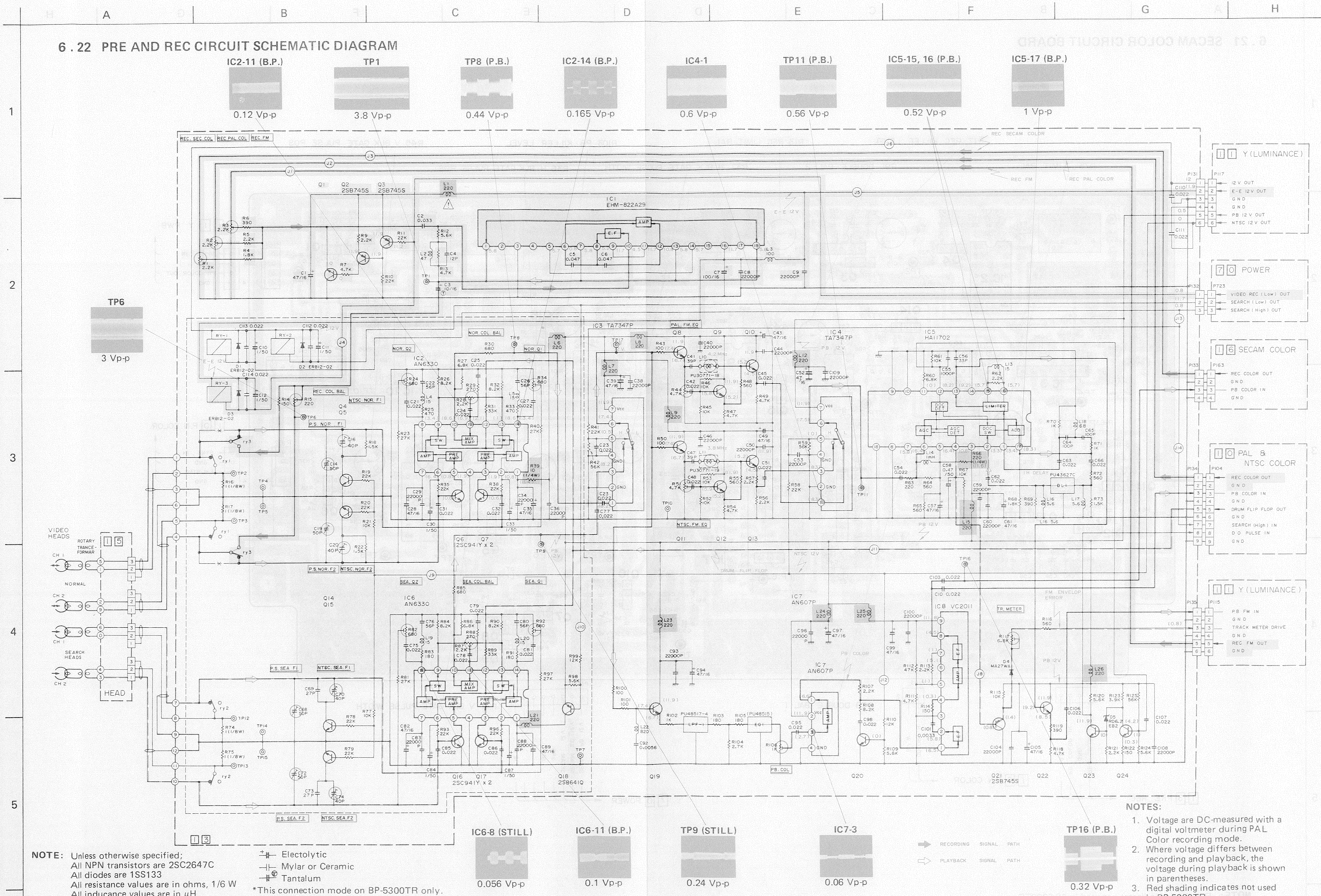
NOTES :
1. Voltage are DC-measured with a digital voltmeter during SECAM Color recording mode.
2. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.
3. Red shading indicates not used in BP-5300TR.
4. Shaded (⚠ or ▒) parts are critical for safety.
5. Replace only with specified part numbers.

6.21 SECAM COLOR CIRCUIT BOARD


R17 REC KILLER LEVEL
R13 REC LIMIT BAL
R103 PB KILLER LEVEL
R45 V BLK GATE PULSE POS
R75 LIMIT BAL
R91 DOUBLE BAL-2
R32 H BLK GATE PULSE WIDTH
R36 H BLK GATE PULSE POS
R78 DOUBLE BAL-1
R41 V BLK GATE PULSE WIDTH
11 Y PWB
P161
VIDEO IN
GND
PB COLOR OUT
GND
10 P.N. COLOR
P162
SYNC IN
GND
F.H. SYNC IN
GND
P163
REC COLOR OUT
GND
PB COLOR IN
GND
13 PRE REC
P165
COLOR H
B/W
10 P.N. COLOR
P164
SECAM PB 12V
SECAM EE 12V
SECAM
GND
GND
12 V
70 POWER
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
BB1
BB2
BB3
BPF1
BPF2
BPF3
BPF4
HPF1
EQ1
EQ2
EQ3
LC1
CF1
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
PU21429 SECAM COLOUR PWB

NOTE: Red shading indicates not used in BP-5300TR.

6.22 PRE AND REC CIRCUIT SCHEMATIC DIAGRAM

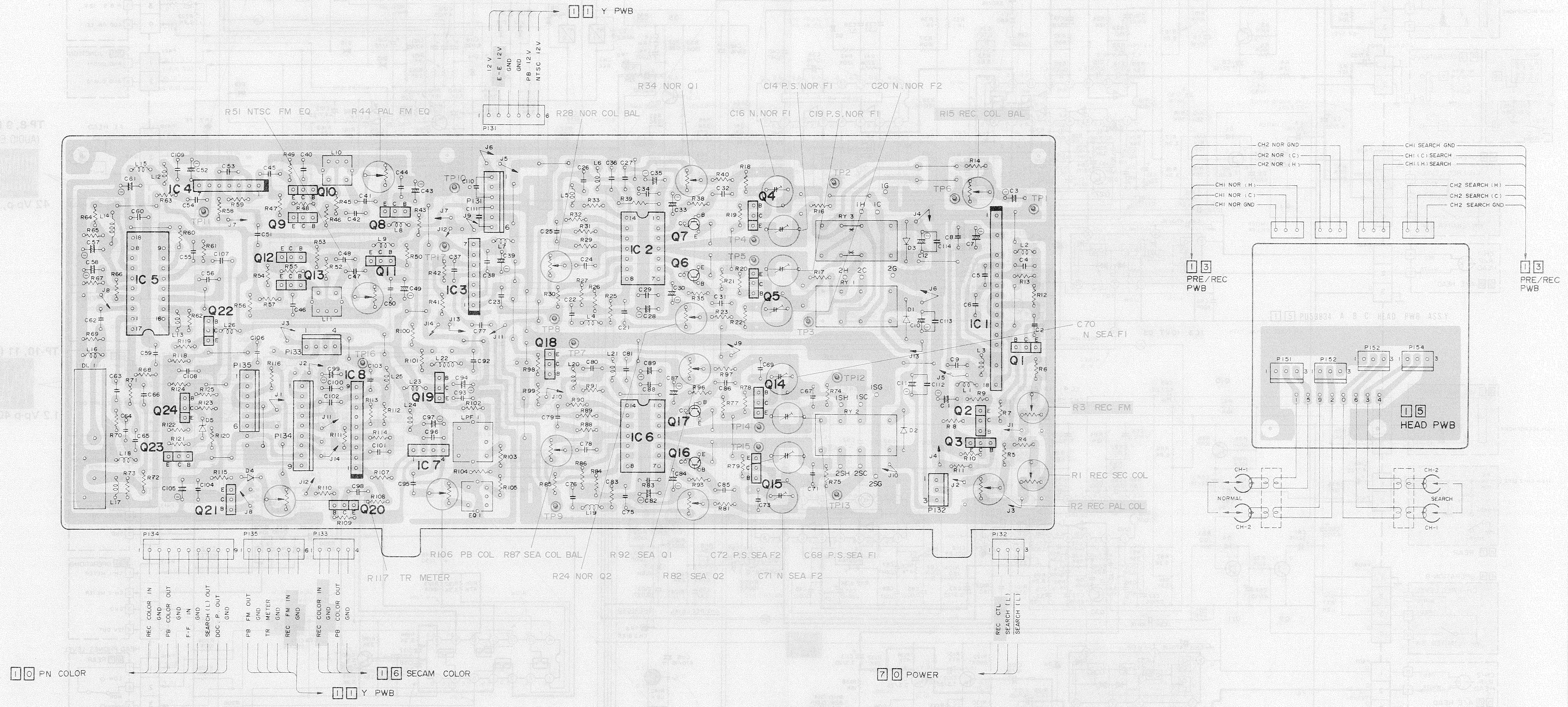

A
B
C
D
E
F
G
H
1
2
3
4
5
6
IC2-11 (B.P.)
0.12 Vp-p
TP1
3.8 Vp-p
TP8 (P.B.)
0.44 Vp-p
IC2-14 (B.P.)
0.165 Vp-p
IC4-1
0.6 Vp-p
TP11 (P.B.)
0.56 Vp-p
IC5-15, 16 (P.B.)
0.52 Vp-p
IC5-17 (B.P.)
1 Vp-p
TP6
3 Vp-p
IC6-8 (STILL)
0.056 Vp-p
IC6-11 (B.P.)
0.1 Vp-p
TP9 (STILL)
0.24 Vp-p
IC7-3
0.06 Vp-p
TP16 (P.B.)
0.32 Vp-p
IC1 EHM-822A29
IC2 AN6330
IC3 TA7347P
IC4 TA7347P
IC5 HA11702
IC6 AN6330
IC7 AN607P
IC8 VC2011
Q2 2SB745S
Q3 2SB745S
Q6 Q7 2SC941Y x 2
Q16 Q17 2SC941Y x 2
Q18 2SB641Q
Q21 2SB745S
VIDEO HEADS
ROTARY TRANCE-FORMAR
NORMAL
SEARCH HEADS
HEAD
CH 1
CH 2
Y (LUMINANCE)
12 V OUT
E-E 12 V OUT
GND
PB 12 V OUT
NTSC 12 V OUT
POWER
VIDEO REC (Low) OUT
SEARCH (Low) OUT
SEARCH (High) OUT
SECAM COLOR
REC COLOR OUT
PB COLOR IN
PAL & NTSC COLOR
DRUM FLIP FLOP OUT
SEARCH (High) IN
D.O. PULSE IN
PB FM IN
TRACK METER DRIVE
REC FM OUT
REC SECAM COLOR
REC FM
REC PAL COLOR
DRUM FLIP FLOP
FM ENVELOPE ERROR
TR. METER
RECORDING SIGNAL PATH
PLAYBACK SIGNAL PATH

NOTE: Unless otherwise specified;
All NPN transistors are 2SC2647C
All diodes are 1SS133
All resistance values are in ohms, 1/6 W
All inducance values are in μH
All capacitance values are in μF

Electolytic
Mylar or Ceramic
Tantalum
*This connection mode on BP-5300TR only.

NOTES:
1. Voltage are DC-measured with a digital voltmeter during PAL Color recording mode.
2. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.
3. Red shading indicates not used in BP-5300TR.
4. Shaded (⚠ or ▨) parts are critical for safety.
5. Replace only with specified part numbers.

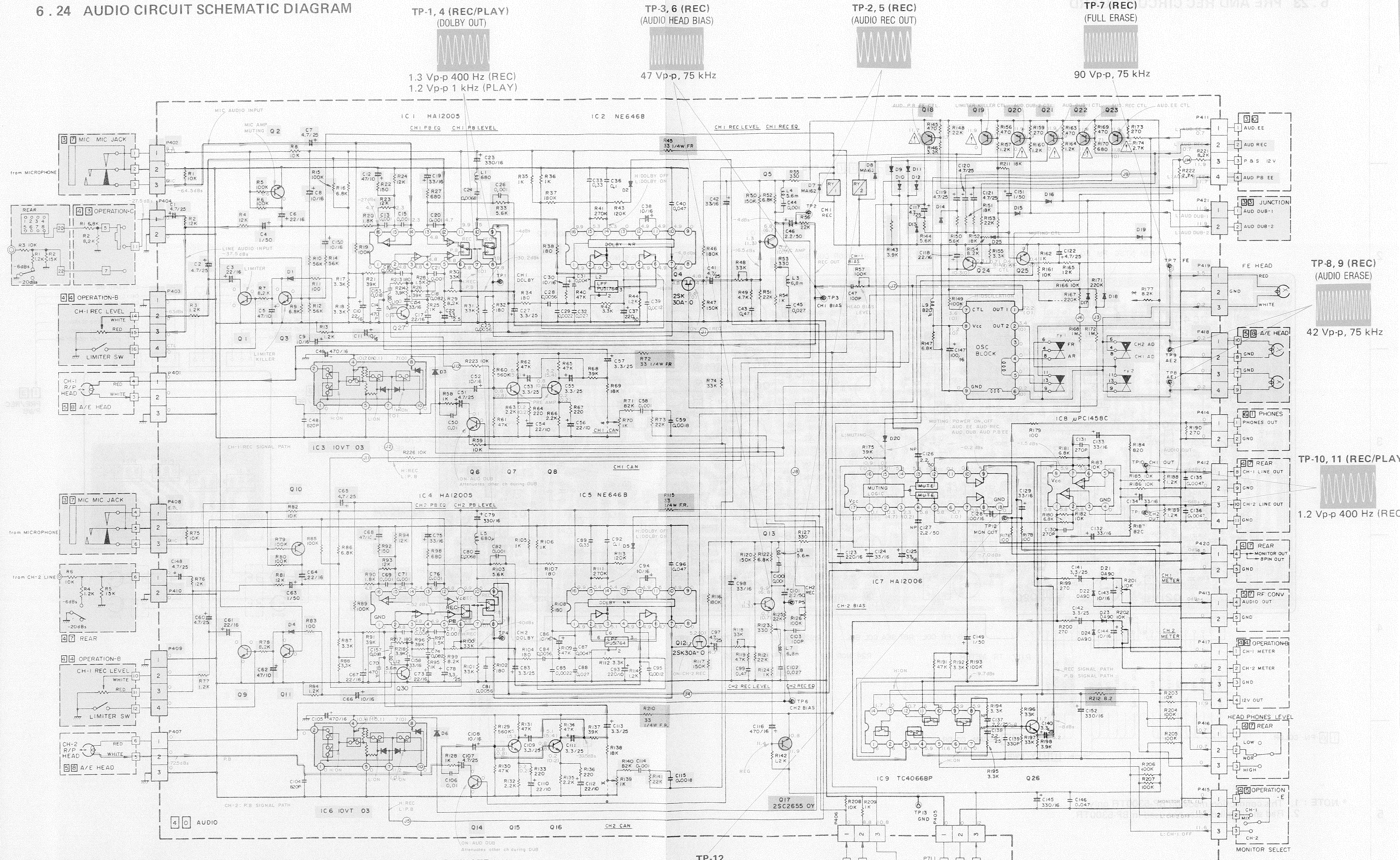
6.23 PRE AND REC CIRCUIT BOARD


A
B
C
D
E
F
G
H
1
2
3
4
5
6
1 1 Y PWB
12 V
E-E 12V
GND
GND
PB 12V
NTSC 12V
P131
R51 NTSC FM EQ
R44 PAL FM EQ
R28 NOR COL BAL
R34 NOR Q1
C14 P.S. NOR F1
C20 N. NOR F2
C16 N. NOR F1
C19 P.S. NOR F1
R15 REC COL BAL
C70 N. SEA F1
R3 REC FM
R1 REC SEC COL
R2 REC PAL COL
R106 PB COL
R87 SEA COL BAL
R92 SEA Q1
C72 P.S. SEA F2
C68 P.S. SEA F1
R117 TR METER
R24 NOR Q2
R82 SEA Q2
C71 N. SEA F2
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
P134
P135
P133
P132
REC COLOR IN
GND
PB COLOR OUT
GND
F.F
GND
SEARCH (L) OUT
DOC P. OUT
GND
PB FM OUT
TR METER
GND
REC FM IN
REC COLOR IN
GND
PB COLOR OUT
GND
REC CTL
SEARCH (L)
SEARCH
1 0 PN COLOR
1 6 SECAM COLOR
1 1 Y PWB
7 0 POWER
CH2 NOR GND
CH2 NOR (C)
CH2 NOR (H)
CH1 NOR (H)
CH1 NOR (C)
CH1 NOR GND
CH1 SEARCH GND
CH1 (C) SEARCH
CH1 (H) SEARCH
CH2 SEARCH (H)
CH2 SEARCH (C)
CH2 SEARCH GND
1 3 PRE/REC PWB
1 3 PRE/REC PWB
1 5 HEAD PWB
P151
P152
P154
NORMAL
SEARCH
CH-1
CH-2

*** NOTE :** 1. This connection made on BP-5300TR only.
2. Red shading indicates not used in BP-5300TR.

6-21 PRE/REC BOARD
(AUDIO SCHEMATIC)

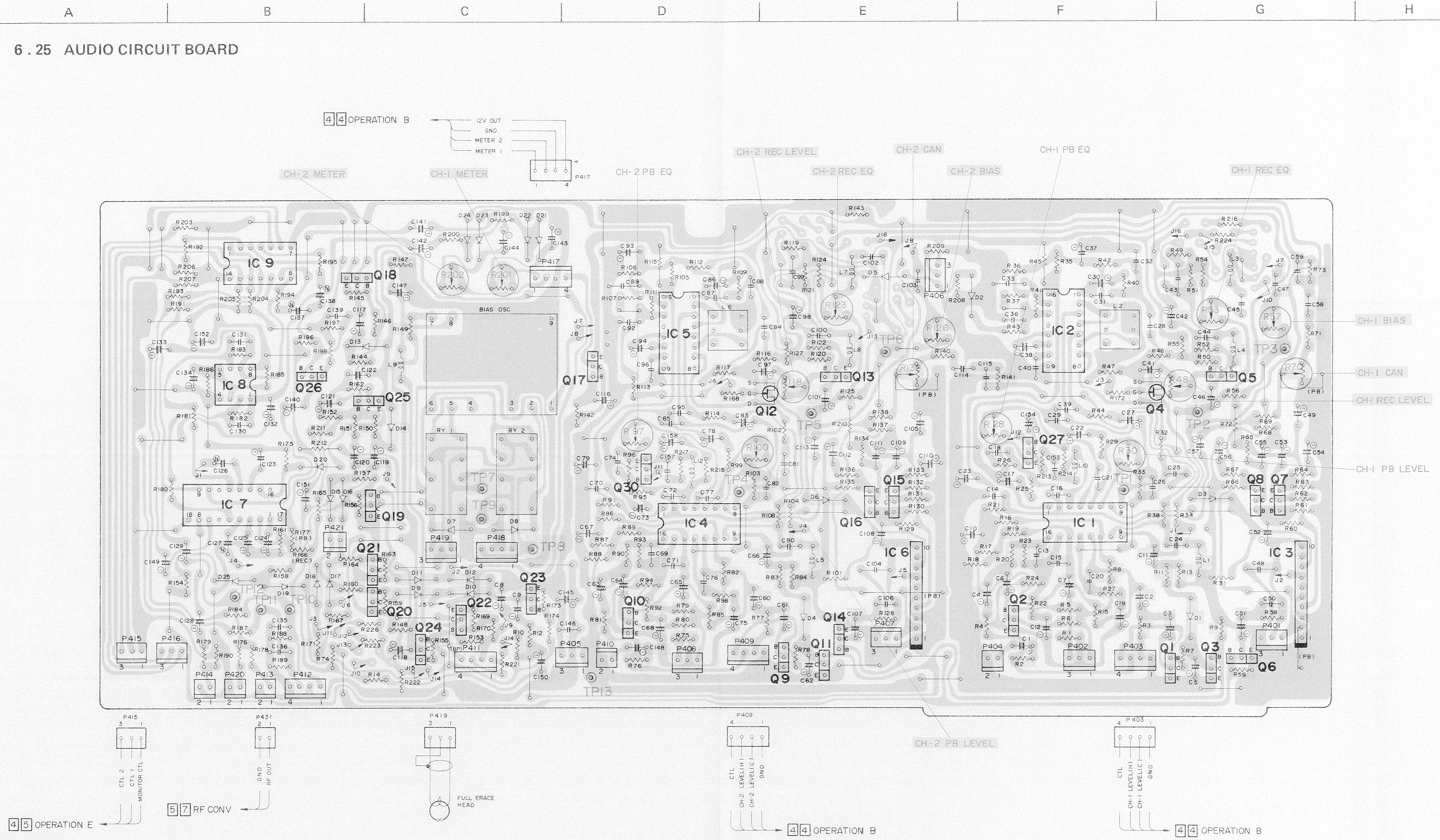
6 . 24 AUDIO CIRCUIT SCHEMATIC DIAGRAM


TP-1, 4 (REC/PLAY)
(DOLBY OUT)
1.3 Vp-p 400 Hz (REC)
1.2 Vp-p 1 kHz (PLAY)
TP-3, 6 (REC)
(AUDIO HEAD BIAS)
47 Vp-p, 75 kHz
TP-2, 5 (REC)
(AUDIO REC OUT)
TP-7 (REC)
(FULL ERASE)
90 Vp-p, 75 kHz
TP-8, 9 (REC)
(AUDIO ERASE)
42 Vp-p, 75 kHz
TP-10, 11 (REC/PLA
1.2 Vp-p 400 Hz (REC
IC1 HA12005
IC2 NE646B
IC3 10VT 03
IC4 HA12005
IC5 NE646B
IC6 10VT 03
IC7 HA12006
IC8 μPC1458C
IC9 TC4066BP
MIC MIC JACK
from MICROPHONE
OPERATION-C
REAR
OPERATION-B
CH-1 REC LEVEL
LIMITER SW
CH-1 R/P HEAD
A/E HEAD
from CH-2 LINE
CH-2 R/P HEAD
AUDIO
FE HEAD
A/E HEAD
PHONES
JUNCTION
RF CONV
HEAD PHONES LEVEL
MONITOR SELECT
OSC BLOCK
DOLBY NR
MUTING LOGIC
TP-12
(MONITOR OUT)
2.4 Vp-p
POWER
OPERATION-C

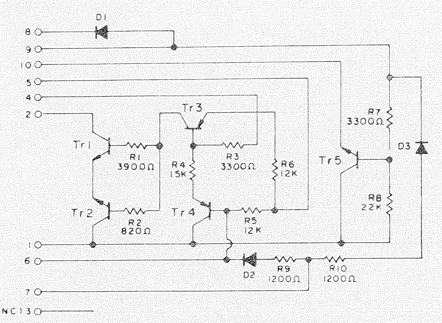
NOTE: Unless otherwise specified;
All NPN transistors are 2SC2021R
All PNP transistors are 2SB788T
All diodes are MA150
All capacitance values are in microfarads
All inductance values are in henries
All resistance values are in ohms, 1/6 W

*NOTES:
1. This connection made on BP-5300TR only.
2. Red shading indicates not used in BP-5300TR.
3. Shaded (⚠ or ▨) parts are critical for safety.
4. Replace only with specified part numbers.

6.25 AUDIO CIRCUIT BOARD


A
B
C
D
E
F
G
H
1
2
3
4
4 4 OPERATION B
12V OUT
GND
METER 2
METER 1
P417
CH-2 METER
CH-1 METER
CH-2 PB EQ
CH-2 REC LEVEL
CH-2 REC EQ
CH-2 CAN
CH-2 BIAS
CH-1 PB EQ
CH-1 REC EQ
CH-1 BIAS
CH-1 CAN
CH-1 REC LEVEL
CH-1 PB LEVEL
CH-2 PB LEVEL
BIAS OSC
RY 1
RY 2
IC 1
IC 2
IC 3
IC 4
IC 5
IC 6
IC 7
IC 8
IC 9
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
Q26
Q27
Q30
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
P401
P402
P403
P404
P405
P406
P407
P409
P410
P411
P412
P413
P414
P415
P416
P418
P419
P420
P421
P415
CTL 2
CTL 1
MONITOR CTL
4 5 OPERATION E
P431
GND
RF OUT
5 7 RF CONV
P419
FULL ERACE HEAD
P409
CTL
CH-2 LEVEL(H)
CH-2 LEVEL(C)
GND
4 4 OPERATION B
P403
CTL
CH-1 LEVEL(H)
CH-1 LEVEL(C)
GND
4 4 OPERATION B

–10VT03–


5
6
D1
Tr1
Tr2
Tr3
Tr4
Tr5
R1 3900Ω
R2 820Ω
R3 3300Ω
R4 15K
R5 12K
R6 12K
R7 3300Ω
R8 22K
R9 1200Ω
R10 1200Ω
D2
D3
(NC)13

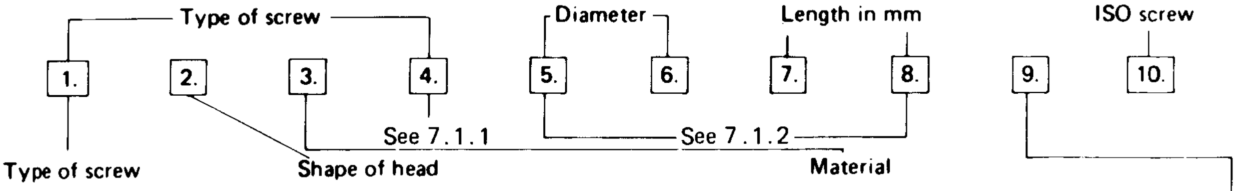
NOTE: Red shading indicates not used in BP-5300TR.

SECTION 7
EXPLODED VIEWS AND PARTS LIST

IMPORTANT SAFETY NOTICE

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

7.1 GENERAL RULES FOR NUMBERING METHOD OF SCREW/WASHER/E-RING


Type of screw
Diameter
Length in mm
ISO screw
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
See 7.1.1
See 7.1.2
Type of screw
Shape of head
Material

S	Normal screw
N	Assembly screw
L	"
D	"
M	W. Wood screw
F	Feather screw
T	Set screw
Y	"
B	Bolt
N	Nut
W	Washer
R	E-ring
E	–
P	Spring
G	Washer head screw

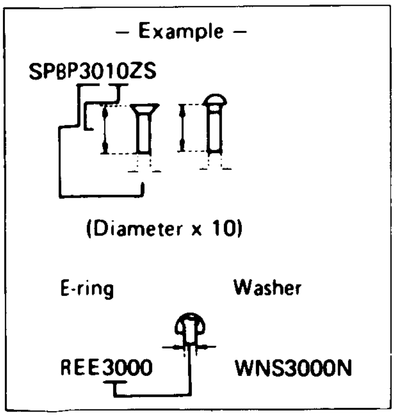
P		Pan head
S		Flat countersunk head
H		Oval countersunk head
D		Binding head
R		Round head
B		Round head
T		Truss head

Symbol letter	Material
S	Steel
E	Stainless steel
C	Cast iron
U	Bronze
B	Brass
P	Phosphor bronze
N	German silver
Y	Brass
A	Aluminum
Z	Zinc-alloy

7.1.1 Type of screw

P	Cross-Recessed head screw
A	Tapping screw
B	Tapping screw
T	Thread rolling tapping screw

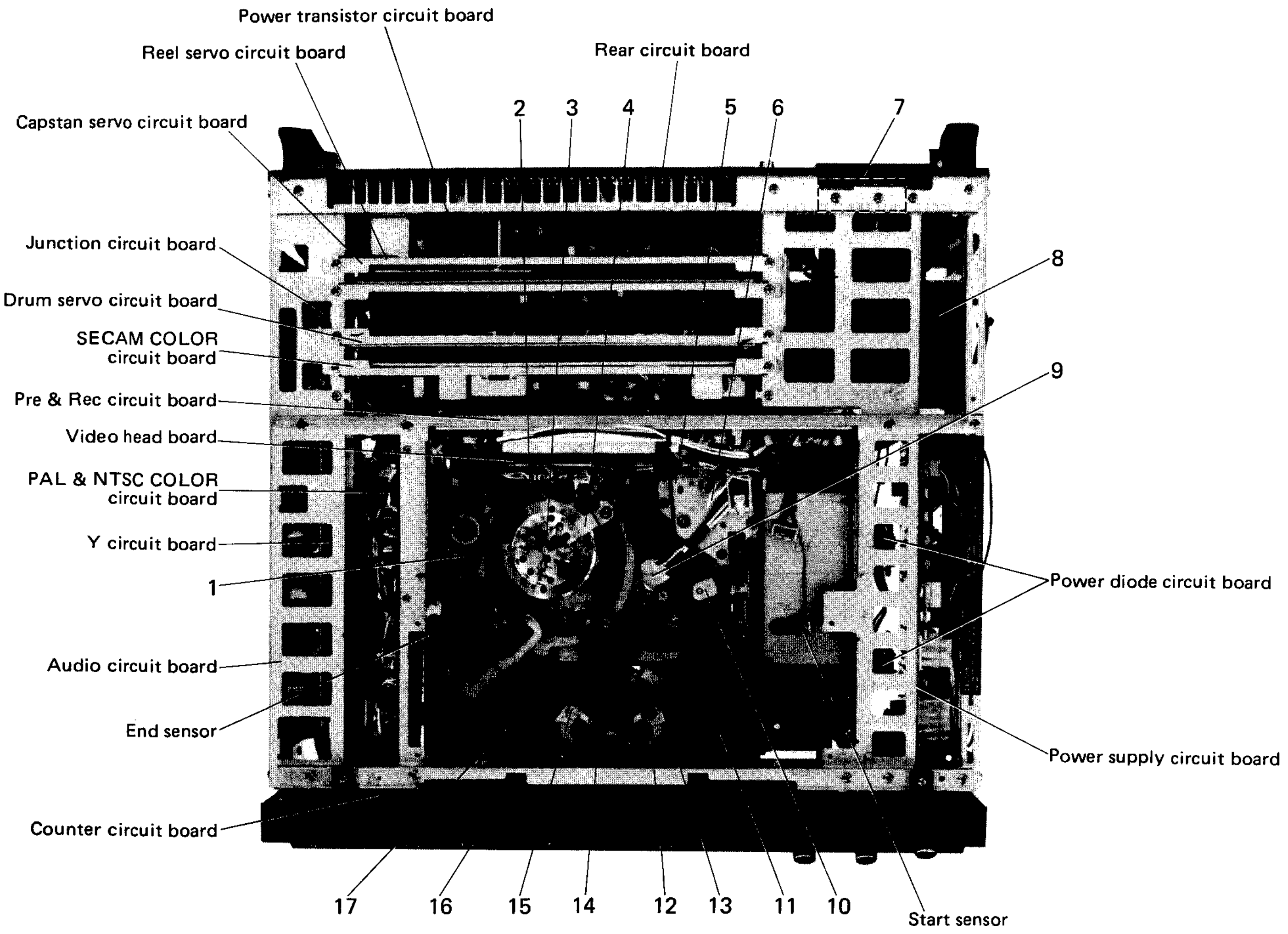
7.1.2 Diameter and Length of screw


– Example –
SPBP3010ZS
(Diameter x 10)
E-ring
Washer
REE3000
WNS3000N

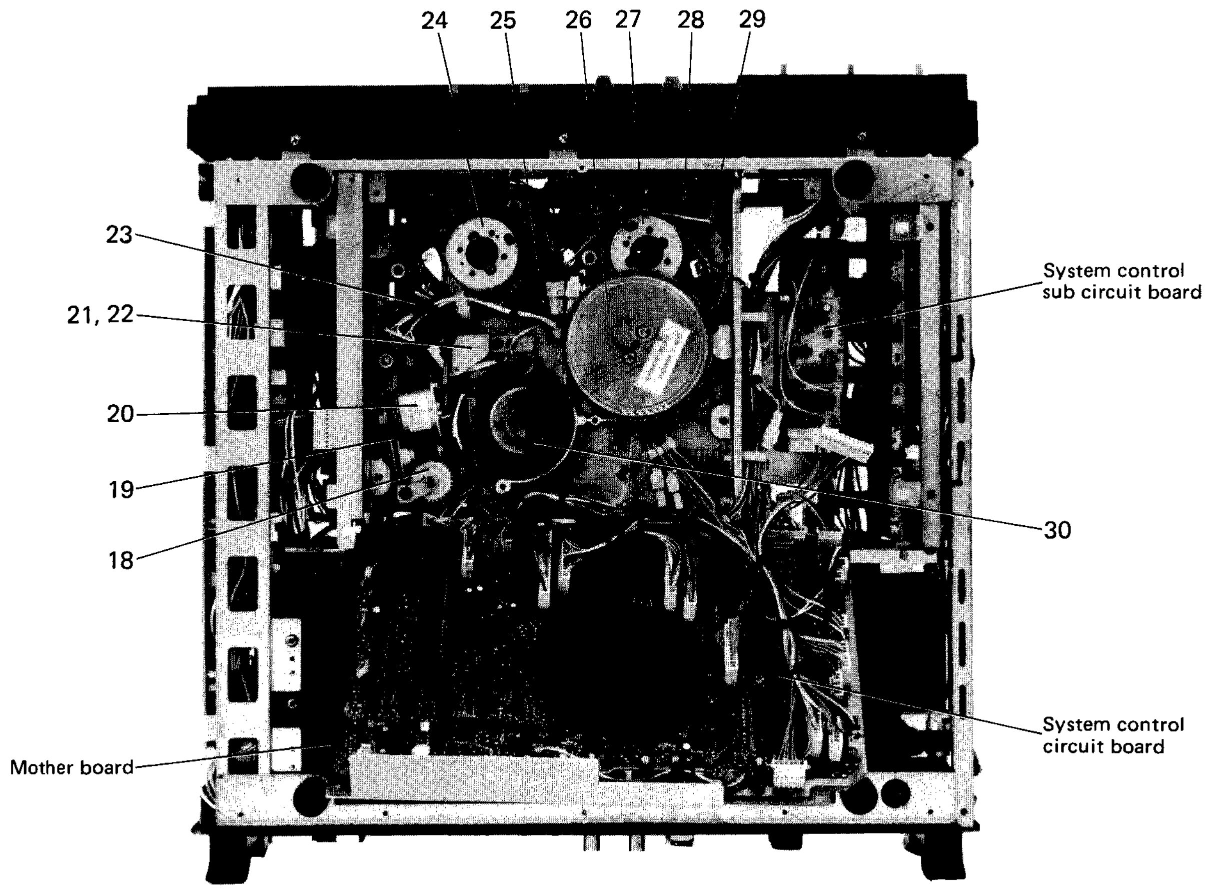
Surface treatment

Symbol letter	Surface treatment
Z	Galvanization, dichromic acid treatment (MFZn2-C)
N	Nickel plating (MFNi2, MFNi1)
R	Chrome plating (MBCr2, MBCr1)
G	Silver plating (SP4)
W	Nichrome platings
P	Phosphite treatment
B	Bronze plating
M	Black coloring after galvanization
F	Iron with black coloring

7.2 MAIN PARTS LOCATION

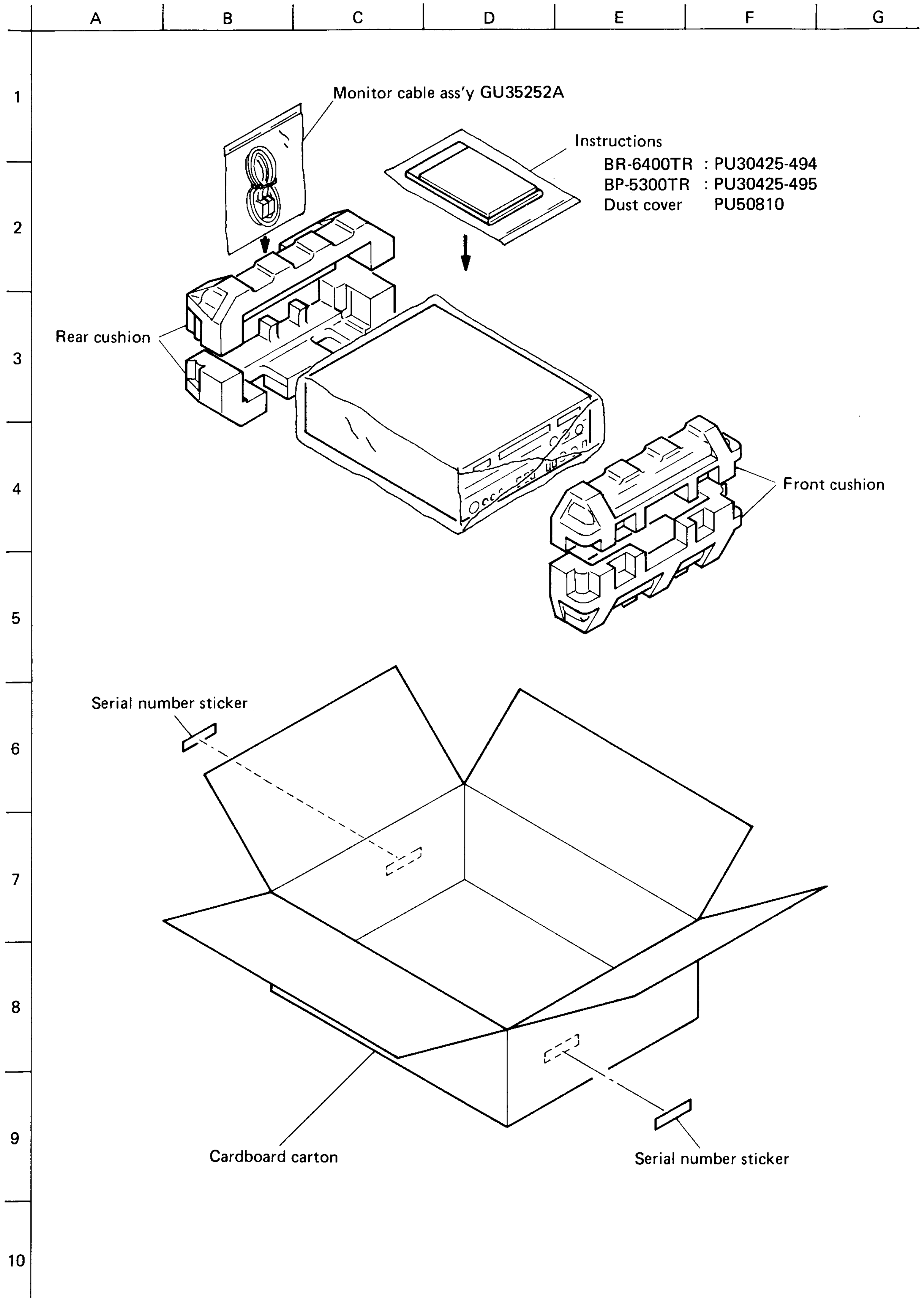

Power transistor circuit board
Reel servo circuit board
Rear circuit board
Capstan servo circuit board
2
3
4
5
6
7
Junction circuit board
8
Drum servo circuit board
SECAM COLOR circuit board
9
Pre & Rec circuit board
Video head board
PAL & NTSC COLOR circuit board
Y circuit board
Power diode circuit board
1
Audio circuit board
End sensor
Power supply circuit board
Counter circuit board
17
16
15
14
12
13
11
10
Start sensor

Symbol No.	Part No.	Part Name	Description
1	PU47863	Full erase head	BR-6400TR only
2	PU20850H	Upper drum ass'y	
3	PU49483	Commutator	
4	PU48678A	Brush ass'y	
5	PU50542-2	Tape guide (Reverse) solenoid	
6	PU50543	Pinch roller solenoid	
7	–	RF convertor	(OPTION)
8	PU54163	Power transformer	
9	PU50584-1A	Audio/Control head ass'y	BR-6400TR only
	PU50584-2A	″	BP-5300TR only
10	PU50554A	Pinch roller holder ass'y	
11	PU50532A	Take-up reel disk ass'y	
12	PU50535B	Take-up brake ass'y	
13	PU50547A	B.T. lever ass'y	
14	PU50594	Cassette lamp	
15	PU50535A	Supply brake ass'y	
16	PU50382A	Record safety switch ass'y	BR-6400TR only
17	PU50532B	Supply reel disk ass'y	

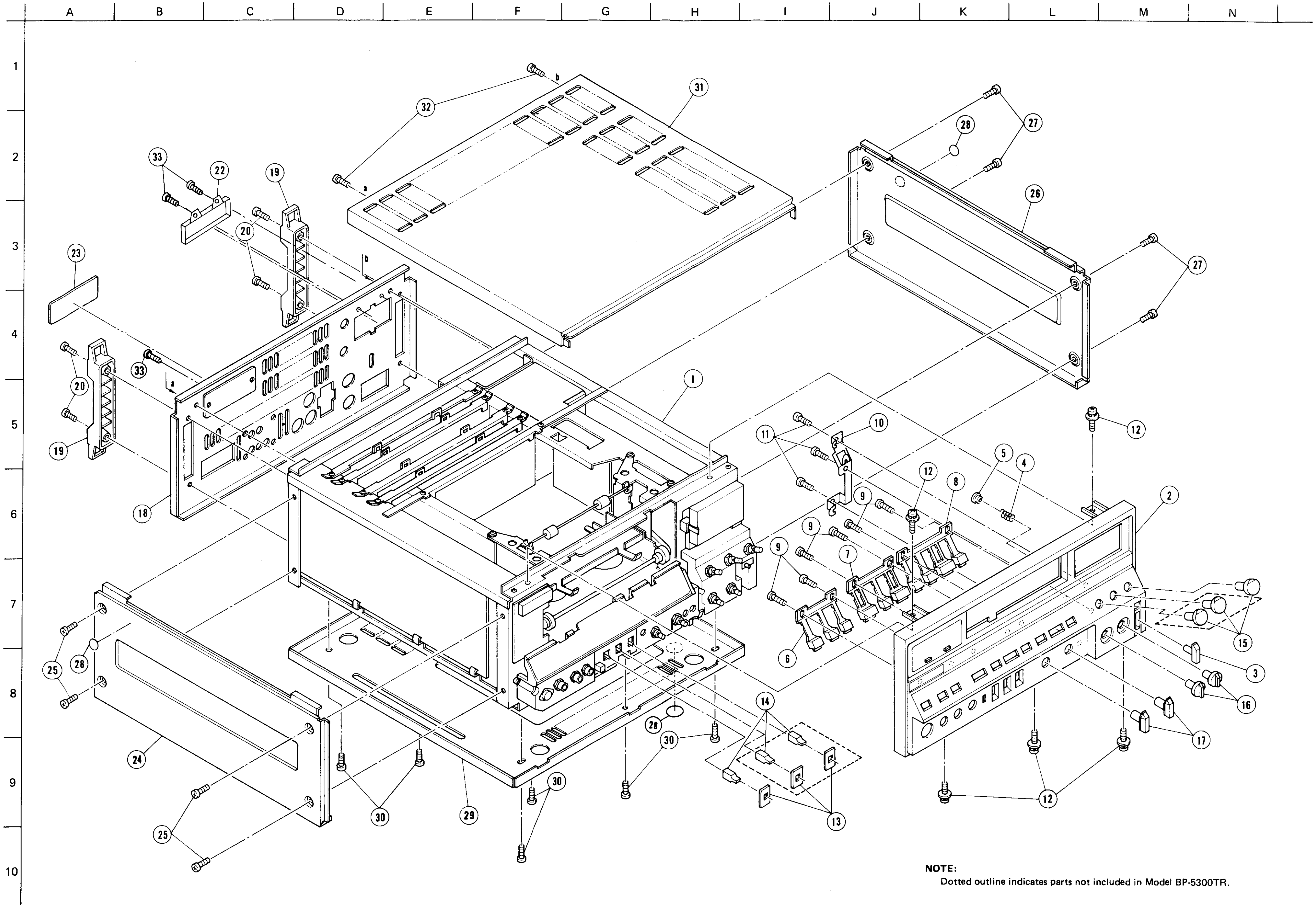

24
25
26
27
28
29
23
21, 22
20
19
18
Mother board
System control sub circuit board
30
System control circuit board

Symbol No.	Part No.	Part Name	Description
18	PU50571A	Loading drive gear ass'y	Incl. (19) and (20)
19	PU50350	Loading belt	
20	PU52745A	Loading motor ass'y	
21	QSM1S11-201	A.L. switch	(inner)
22	QMS1S11-201	U.L. switch	(outer)
23	PU50549A	Differential transformer ass'y	
24	PU50531-2	Supply reel motor	
25	PU50544	L.T. solenoid	
26	PU50530	Capstan motor	
27	PU50531	Take-up reel motor	
28	PU50542	Brake solenoid	
29	PU48959A	Cassette switch ass'y	
30	PUS26687A	Lower drum ass'y	

7.3 REPACKING AND ACCESSORIES


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
Monitor cable ass'y GU35252A
Instructions
BR-6400TR : PU30425-494
BP-5300TR : PU30425-495
Dust cover PU50810
Rear cushion
Front cushion
Serial number sticker
Cardboard carton
Serial number sticker

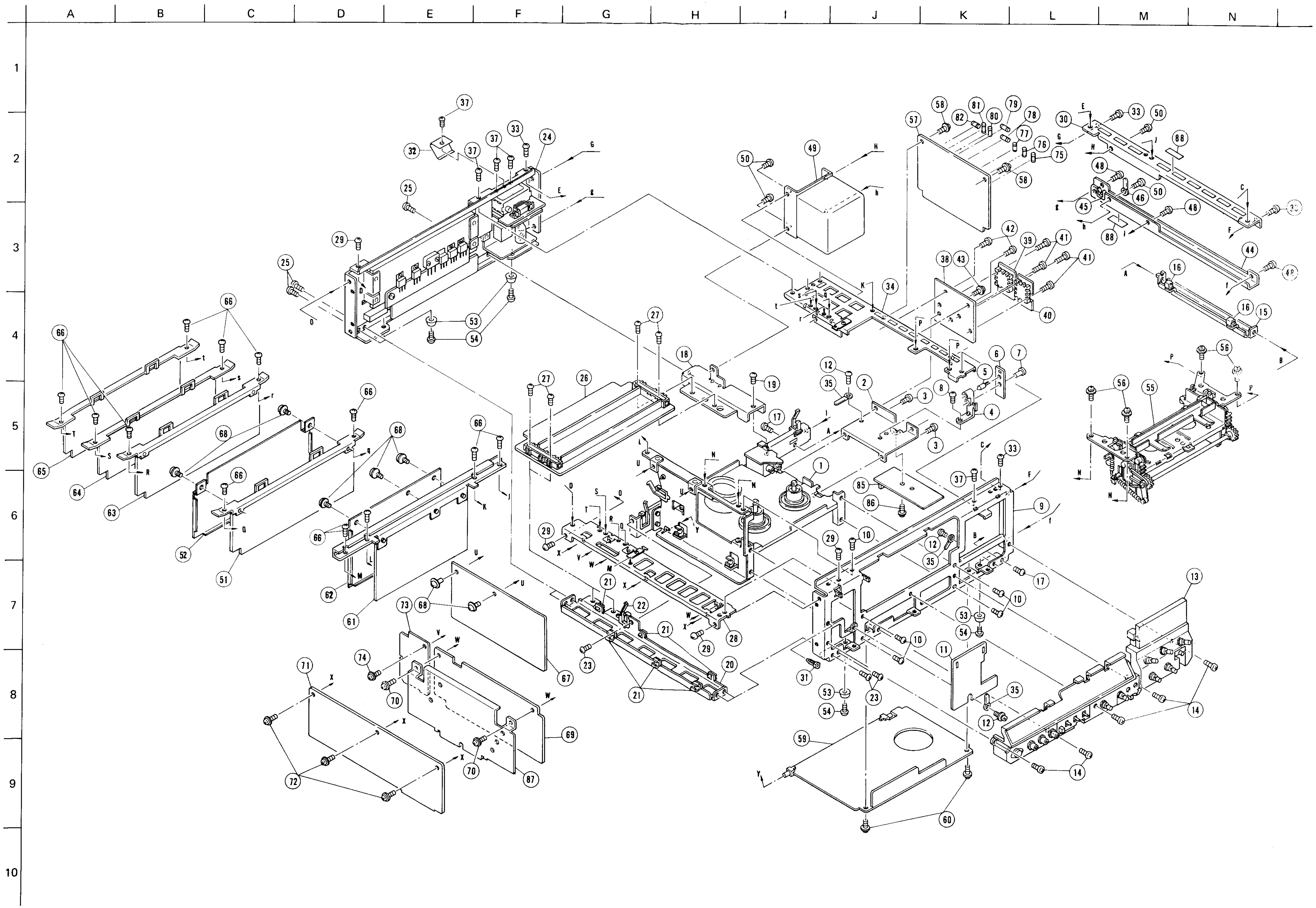
7.4 CABINET ASSEMBLY


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
10
32
b
31
28
27
33
22
19
a
26
20
23
27
20
33
a
1
19
12
11
10
5
4
12
8
2
18
9
9
7
9
15
6
3
16
25
28
17
14
28
30
24
30
12
13
30
29
25
30

NOTE:
Dotted outline indicates parts not included in Model BP-5300TR.

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	–	Chassis Ass'y	See Sec. 7.5.	4-H
⚠ 2	PU10352E	Front Panel Ass'y	BR-6400TR Incl: (3) – (11)	6-M
⚠	PU10352F	"	BP-5300TR Incl: (3) – (11)	6-M
3	PU50508	Knob	POWER	8-N
4	PU30080-50	Spring		5-L
5	PU50509	Bushing		5-K
6	PU32851-1	Push Knob (A)	BR-6400TR	8-I
	" -2	"	BP-5300TR	8-I
7	PU32897	Push Knob (B)		6-J
8	PU32898	" (C)		6-K
9	SDSA3008Z	Tapping Screw		6-1, 6-J
10	PU50656	Earth Plate		5-J
11	SDSA3006Z	Tapping Screw		5-I
12	DPSP3008ZS	Screw		5-K, 5-M, 9-L
13	PU47912	Spacer		9-J
14	PU50188-2	Knob		8-I
15	PU50512	VR Knob		7-N
16	PU50513	SW Knob (A)		8-N
17	PU50514	" (B)		8-N
⚠ 18	PU21417	Rear Panel	BR-6400TR	6-B
⚠	" -2	"	BP-5300TR	6-B
19	PU51215	Foot		2-C, 5-A
20	SDBP4025MS	Screw		3-C, 5-A
21	–	–		3-B
22	PU54246A	RF Converter Cover		2-C
⚠ 23	PU33828	Serial No. Plate	BR-6400TR	3-A
⚠	" -2	"	BP-5300TR	3-A
⚠ 24	PU21157-2	Left Side Panel		9-B
25	SDBP4006RS	Screw		8-A, 10-B
⚠ 26	PU21154-2	Right Side Panel		2-L
27	SDBP4006RS	Screw		2-L, 3-N
28	PU53146-3	Caution Label		2-K, 8-A, 9-G
29	PU10364	Bottom Cover		9-E
30	SBST3006ZS	Screw		8-H, 9-D
⚠ 31	PU10365-2	Top Cover		1-H
32	SDBP3006MS	Screw		1-E
33	SDST3006MS	Screw		2-B, 4-B

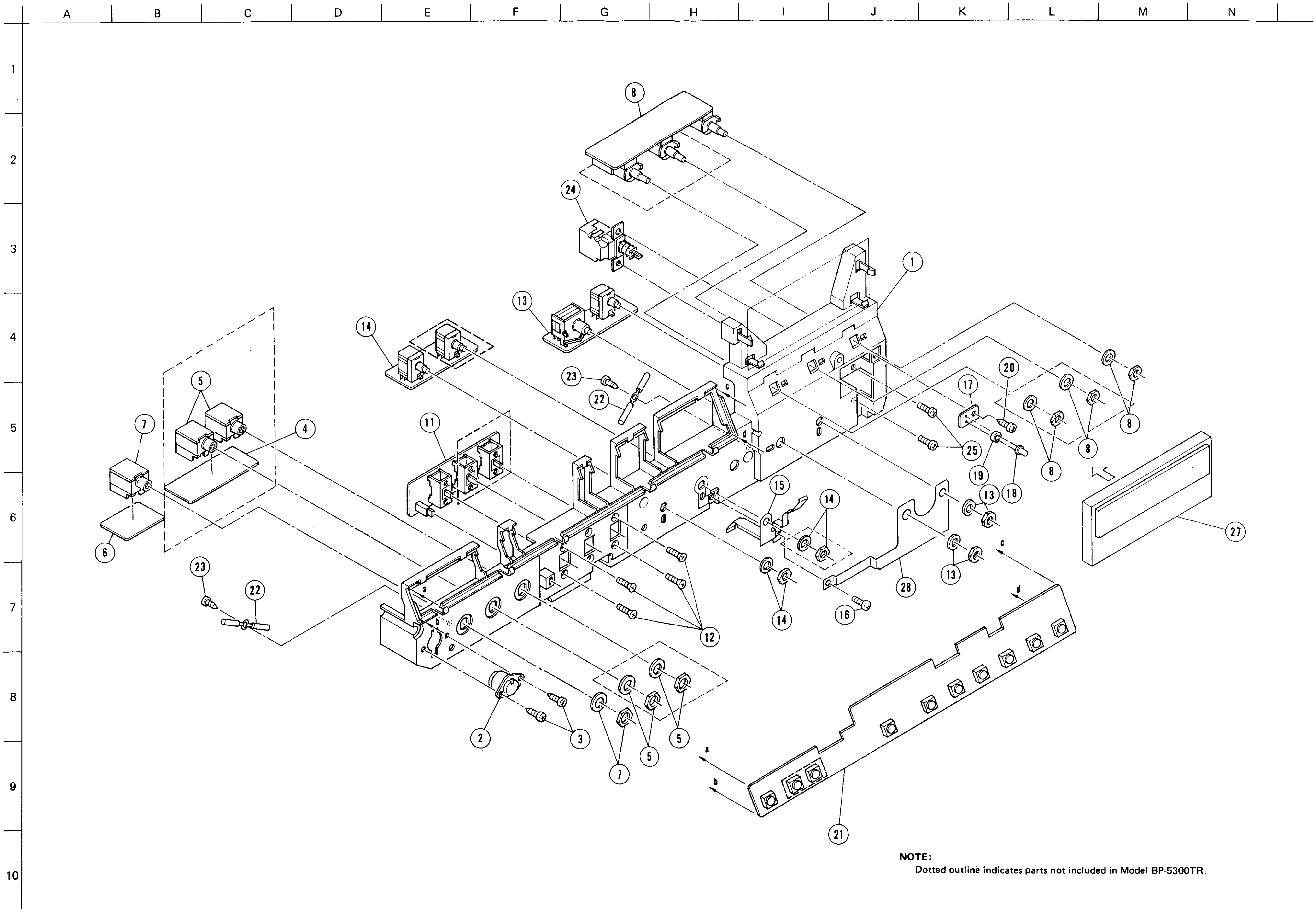
7.5 CHASSIS ASSEMBLY


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
37
38
39
40
41
42
43
44
45
46
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
85
86
87
88

7-6

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	–	Main Deck Ass'y	See Sec. 7.8 and 7.9.	5-I
2	PU54687A	Center Sub-Bracket Ass'y		4-J
3	SBST3006Z	Screw		5-K
4	PU50806	Shade		5-K
5	PN202S	Photo Transistor		4-K
6	PU49136	Sensor Circuit Board		4-K
7	PU48973	Stopper		4-L
8	SBST3008Z	Screw		4-K
9	PU21583A	Front Bracket Ass'y		6-L
10	SBST3006Z	Screw		6-J, 7-J, 7-K, 7-L
11	PU50650A-3	Counter Circuit Board Ass'y	See Sec. 8.5.12.	7-K
12	GBST3006Z	Screw		4-I, 6-K, 8-K
13	–	Mounting Base Ass'y	See Sec. 7.6.	7-N
14	PU49275	Screw		8-N, 9-L
15	PU33027A-4	Power P.W.B. Stay Ass'y	Incl: (16)	4-N
16	PU47876	P.W.B. Holder		3-M, 4-N
17	SBST3006Z	Screw		5-I, 7-L
18	PU32946-1-3	Center Bracket (B)		4-H
19	SBST3006Z	Screw		4-I
20	PU21148A-4	Left Lower Stay Ass'y	Incl: (21) and (22)	8-H
21	PU47876	P.W.B. Holder		7-G, 7-H, 8-G
22	PU49881	Edge Cover		7-G
23	SBST3006Z	Screw		8-G, 8-J
24	–	Rear Frame Ass'y	See Sec. 7.7.	2-F
25	SBST3006Z	Screw		2-E, 3-C
26	PU21432A	Mother Board Ass'y	See Sec. 8.5.9.	4-G
27	SBST3008Z	Screw		4-F, 4-H
28	PU21514A	Left Upper Stay Ass'y		7-H
29	SBST3006Z	Screw		3-D, 6-F, 6-J, 7-H
30	PU21586A	Right Upper Stay Ass'y		1-L, 2-L
31	PU52104	Tapping Sopport		8-I
32	PU51438	RF CONV. Stopper		2-E
33	SBST3006Z	Screw		1-M, 2-F, 2-O, 5-L
34	PU21509A	Center Upper Stay Ass'y	Incl: (35) and (36)	3-J
35	PU49485	Wire Clamp		4-I, 6-K, 8-L
36	–	–		
37	STSB3006ZS	Screw		1-E, 2-E, 6-K
38	PU33639-1-1	Heat Sink (B)		3-K
39	–	Power Diode Board Ass'y	See Sec. 8.5.20.	3-L
40	–	"	See Sec. 8.5.21.	4-L
41	SBSB3016Z	Screw		3-L
42	GBST3008Z	"		3-L
43	GBST3008Z	"		3-K
44	PU21590B	Right Lower Stay Ass'y		3-N
⚠ 45	PU48086	Edge Cover		2-L
⚠ 46	PU49485	Wire Clamp		2-M
⚠ 47	–	–		
48	SBST3006Z	Screw		2-L, 2-M, 2-N, 3-O
⚠ 49	PU54163	Power Transformer		2-I
50	SBST3006Z	Screw		1-M, 2-I, 2-M
51	–		See Sec. 8.5.5.	7-C
52	PU33643	Shield Case		6-B
⚠ 53	QZF2115-002	Foot		4-E, 4-F, 7-K, 8-J
54	GBST3010Z	Screw		4-E, 4-F, 7-K, 8-I
55	–	Cassette Housing Ass'y	See Sec. 7.12.	4-M
56	DPSP3008Z	Screw		4-M, 4-N
57	–	Power Supply Circuit Board Ass'y	See Sec. 8.5.25.	1-J, 2-J
58	GBST3006Z	Screw		1-K, 2-L
59	–	System Control Circuit Board Ass'y	See Sec. 8.5.10.	8-I
60	SBSB3008Z	Screw		9-K
61	–	Pre/Record Circuit Board Ass'y	See Sec. 8.5.3.	7-D
62	PU33706A	Pre/Record Shield Board Ass'y		7-D
63	–	Drum Servo Circuit Board Ass'y	See Sec. 8.5.8.	6-A
64	–	Capstan Servo Circuit Board Ass'y	See Sec. 8.5.7.	6-A
65	–	Reel Servo Circuit Board Ass'y	See Sec. 8.5.6.	5-A, 6-A
66	SBST3006Z	Screw		4-A, 4-C, 5-D, 5-F, 6-C
67	–	P. N. Color PWB Ass'y	See Sec. 8.5.1.	8-G
68	GBST3006Z	Screw		5-E, 7-E
69	–	Y Circuit Board Ass'y	See Sec. 8.5.2.	8-G
70	GBST-3006Z	Screw		8-E, 9-E, 9-F
71	–	Audio Circuit Board Ass'y	See Sec. 8.5.13.	8-D
72	GBST3006Z	Screw		9-D
73	–	Junction Circuit Board Ass'y	See Sec. 8.5.11.	7-E
74	GBST3008Z	Screw		8-D
⚠ 75	QMF51A2-3R15	Fuse	F3 3.15 A 250 V	2-L
⚠ 76	" -2R5	"	F4 2.5 A 250 V	2-L
⚠ 77	" -5R0	"	F5 5.0 A 250 V	2-L
⚠ 78	" -1R25	"	F6 1.25 A 250 V	1-L
⚠ 79	" -R80	"	F7 0.8 A 250 V	1-L
⚠ 80	" -R80	"	F8 0.8 A 250 V	1-K
⚠ 81	" -1R0	"	F10 1.0 A 250 V	1-K
⚠ 82	" -1R0	"	F9 1.0 A 250 V	1-K
83	–	–		
84	–	–		
85	–	System Control Sub Board Ass'y	See Sec. 8.5.24.	6-J
86	GBST3006Z	Screw		6-J
87	PU33677A	Shield Cover Ass'y		9-F
88	PU51306	Fuse Sticker		2-M, 3-M
89	–	–		
90	–	–		

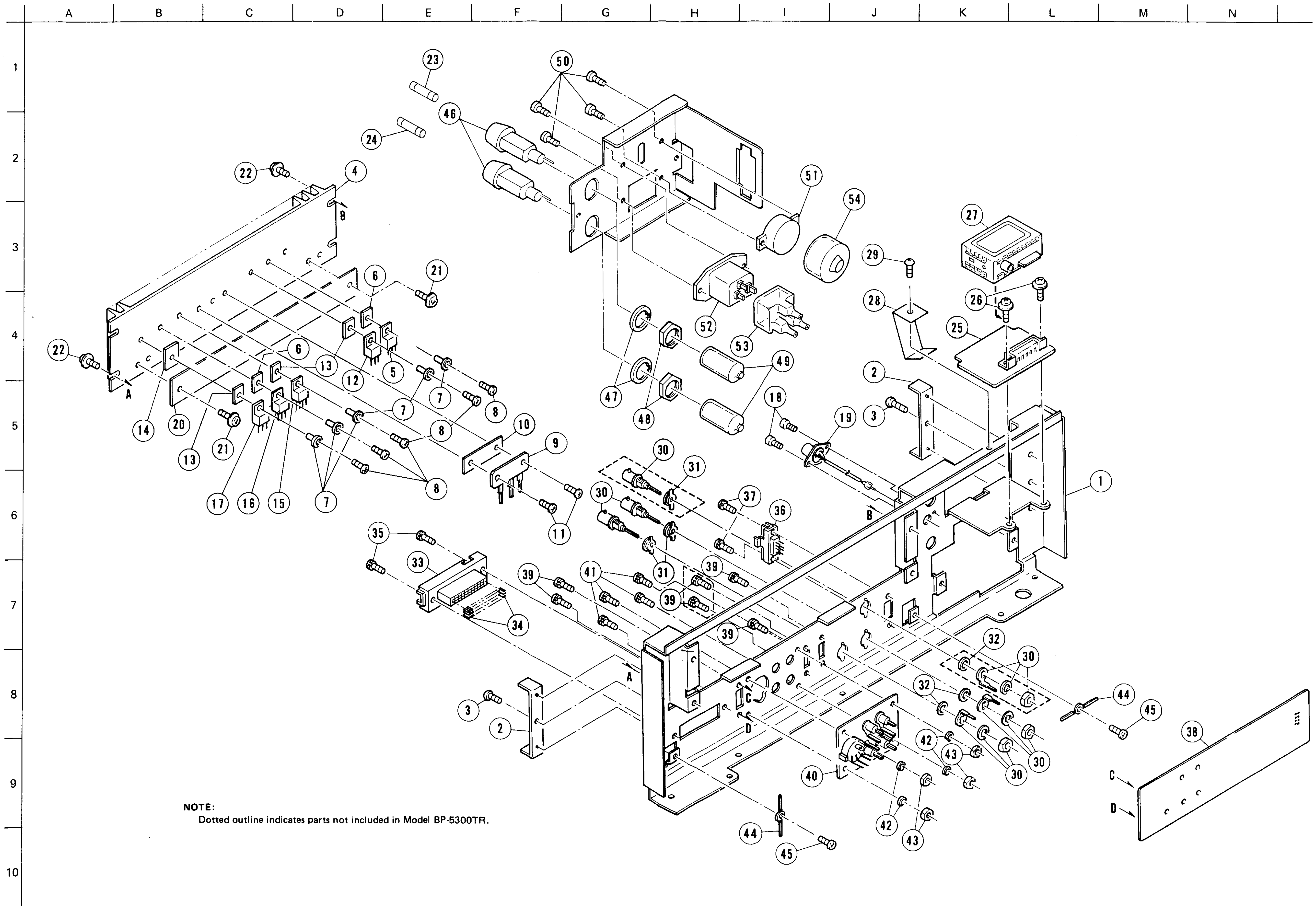
7.6 MOUNTING BASE ASSEMBLY


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
10
8
24
1
13
14
23
22
5
4
7
11
20
17
25
19
18
8
8
8
8
15
14
13
6
23
22
12
14
16
28
13
27
2
3
7
5
5
21
a
b
c
d

NOTE:
Dotted outline indicates parts not included in Model BP-5300TR.

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	PU10354	Mounting Base		3-J
2	PU50793	DIN Socket		8-F
3	SDSA3008Z	Tapping Screw		8-G
4	PU32817	Microphone Circuit Board	BR-6400TR only	5-D
5	PU51574	Microphone Jack	BR-6400TR only	9-H, 8-H, 4-B, 4-C
6	PU50799	Headphones Circuit Board		6-A
7	PU51575	Headphone Jack		9-G, 5-B
8	–	Operation (B) Circuit Board Ass'y	BR-6400 See Sec. 8.5.15.	6-L, 5-M, 5-L, 5-H, 1-G
9	–	–		
10	–	–		
11	–	Operation (C) Circuit Board Ass'y	See Sec. 8.5.16.	5-E
12	SSSP2604Z	Screw		7-H
13	–	Operation (D) Circuit Board Ass'y	See Sec. 8.5.17.	4-F, 6-K, 7-K
14	–	Operation (E) Circuit Board Ass'y	See Sec. 8.5.18.	7-I, 6-J, 6-I, 4-D
⚠ 15	PU50657	Earth Plate (B)		6-I
16	SDSA3008Z	Tapping Screw		7-J
17	PU50612	Power LED Circuit Board		5-K
18	SLR54UT4	LED		6-L
19	PU50633	Spacer		6-K
20	SDSA3008Z	Tapping Screw		4-L, 4-K
21	–	Operation (A) Circuit Board Ass'y	See Sec. 8.5.14.	10-J
22	PU49486	Wire Clamp		7-C, 5-G
23	SDSA3006Z	Tapping Screw		7-C, 7-B, 4-G
⚠ 24	PUS46445	Push Switch Ass'y	POWER	2-G
25	SBST3006ZS	Screw		5-K
26	–	–		
27	PU50798-3	Meter		6-N
⚠ 28	PU52408	Earth Plate (C)		7-J

7.7 REAR FRAME ASSEMBLY

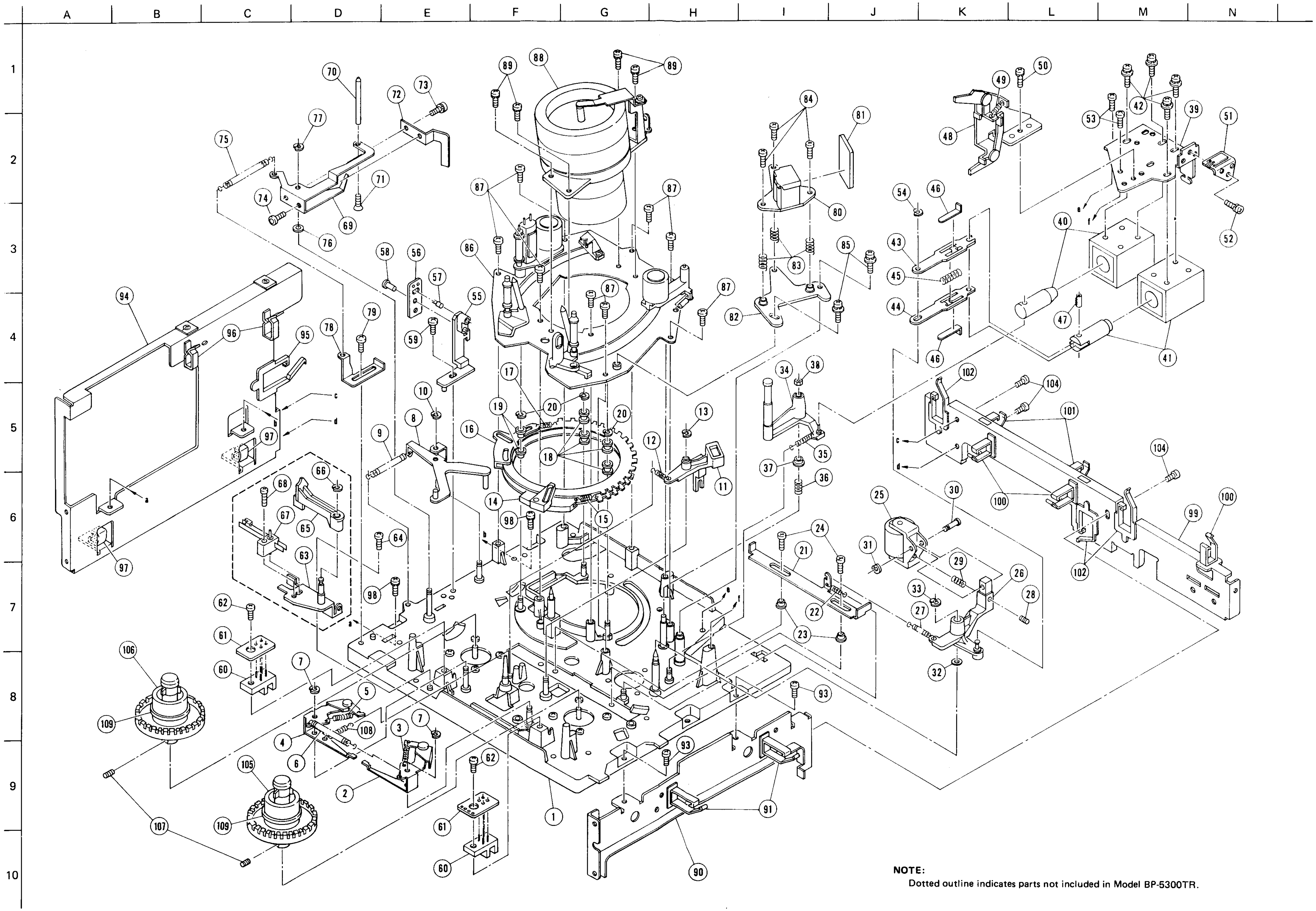

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
A
B
C
D

NOTE:
Dotted outline indicates parts not included in Model BP-5300TR.

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	PU21416	Rear Bracket		6-M
2	PU51406	Rear Stay		8-F, 4-J
3	SBST3006Z	Screw		8-E, 5-J
4	PU32948-1-3	Heat Sink (A)		2-D
⚠ 5	2SC2484Q	Transistor	Q5001	4-E
6	PU45375-11	Spacer		4-D, 3-D
7	PU41624-6	Insulation Washer		6-D, 5-E
8	SDSP3012Z	Screw		6-E, 5-F, 5-E
⚠ 9	2SD845	Transistor	Q5003	5-F
10	PU50809	Spacer		5-F
11	SDSP3012Z	Screw		6-G, 6-F
⚠ 12	2SD1128-02	Transistor	Q5004	5-D, 4-D
13	PU45375	Spacer		5-B, 4-D
14	PU53597	Spacer		5-B
⚠ 15	2SD837Q	Transistor	Q5005	6-C
⚠ 16	2SC2484Q	Transistor	Q5002	6-C
⚠ 17	UPC7815H	IC	IC2001	6-C
18	SDSP3006M	Screw		5-I
19	PU46471	Aerial Connector		5-J
20	–	Power Transistor Circuit Board Ass'y	See Sec. 8.5.22.	5-B
21	GBST3008Z	Screw		5-C, 3-E
22	GBST3008Z	"		4-A, 2-C
⚠ 23	QMF51A2-3R15	Fuse F13.15 A		1-E
⚠ 24	" -1R6	Fuse F21.6 A		2-D
25	–	RF Converter Mount Board Ass'y	See Sec. 8.5.24.	4-K
26	GBST3010Z	Screw		4-K
27	–	RF Converter	(OPTION)	3-K
28	PU51438	RF Converter Stopper		4-J
29	SBST3006Z	Screw		3-J
30	PU51213	BNC Connector		9-L, 8-L, 6-G, 5-H
31	PU48611	Ring		7-H, 6-H, 5-H
32	Q03093-439	Washer		8-K, 7-K
33	PU44246-5	45-pin Connector	Crimp Type	7-E
	" -1	"	Solder Type	
34	SC-1600-112	Crimp Contact		7-F
35	LPSP2610Z	Screw		6-D
36	PU51214	8-pin Connector		6-I
37	LPSP2310Z	Screw		6-I
38	–	Rear Circuit Board Ass'y	See Sec. 8.5.18.	8-N
39	LPSP2604Z	Screw		7-H, 7-F
40	PU53989	Jack Ass'Y	BR-6400TR	9-I
	PU53990	Jack Ass'y	BP-5300TR	
41	LPSP3008Z	Screw		7-G
42	WLS3000N	Lock Washer		9-K, 9-J
43	NNS3000Z	Nut		10-J, 9-K
44	PU49486	Wire Clamp		10-I, 8-M
45	SBST3006Z	Screw		10-I, 8-M
⚠ 46	QMG0301-003	Fuse Holder	Incl: (47), (48)	2-E
⚠ 47	–	Washer		5-G
⚠ 48	–	Nut		5-G
⚠ 49	PU50316	Fuse Cover		4-I
⚠ 50	LPSP3008Z	Screw		1-G, 1-F

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
⚠ 51	QSR0085-101	Voltage Selector		2-I
⚠ 52	QMC0335-003	AC Connector		4-H
⚠ 53	PU52931	Connector Cover		4-I, 4-H
⚠ 54	PU54680	Voltage Selector Cover		3-J, 2-J

7.8 MAIN DECK-1 ASSEMBLY

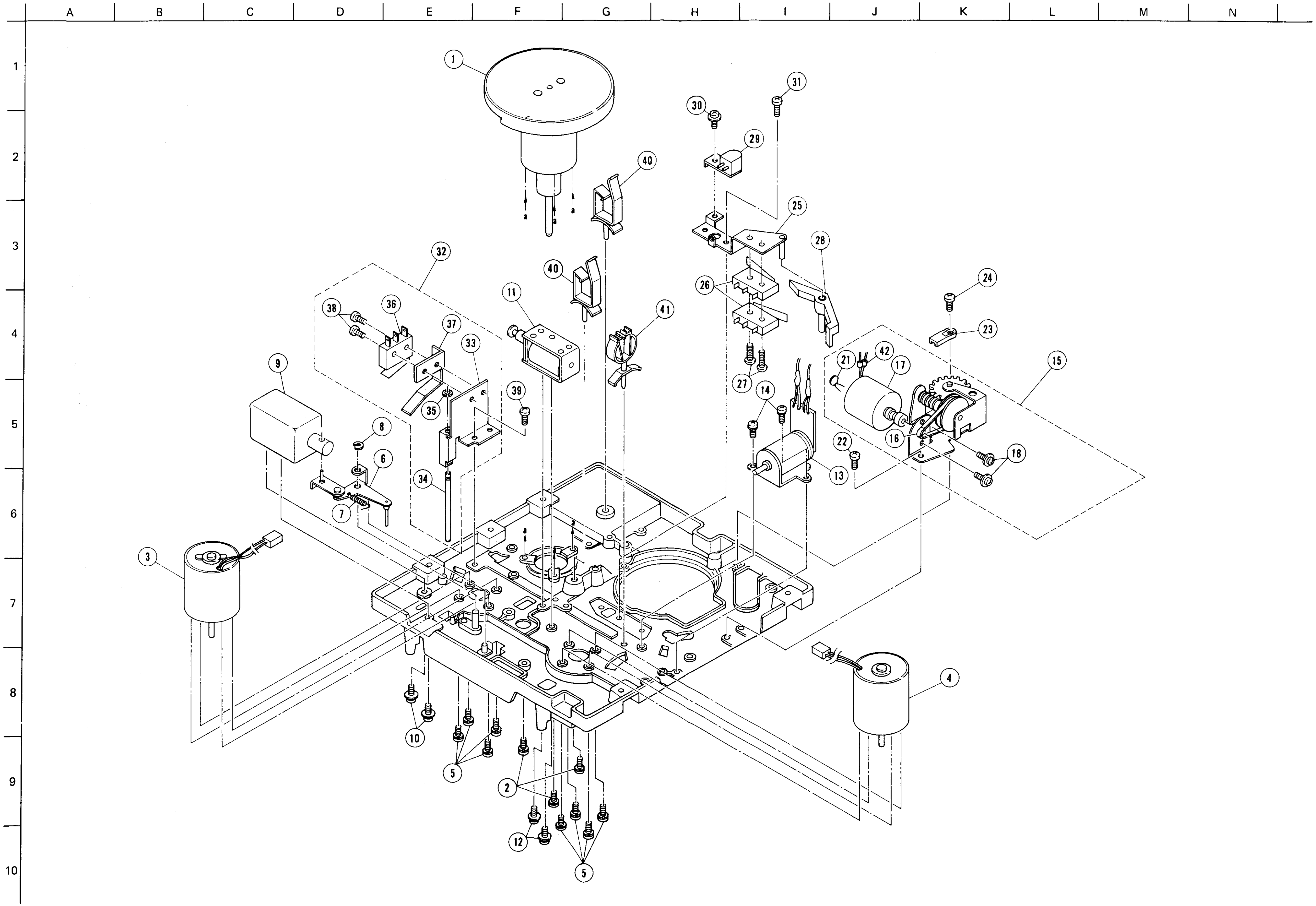

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
10
70
72
73
77
75
71
74
69
76
89
88
89
87
87
86
84
81
80
83
85
87
82
87
49
50
48
42
53
39
51
52
54
46
43
45
44
46
40
47
41
94
96
95
78
79
58
56
57
55
59
10
17
19
20
20
18
16
8
9
12
13
11
14
15
98
34
38
35
37
36
102
104
101
104
100
100
99
100
102
97
97
66
68
67
65
63
64
98
25
30
31
29
26
28
33
27
32
24
21
22
23
23
62
61
60
106
109
7
5
108
4
6
3
7
2
62
61
60
105
109
107
107
1
93
93
91
90
a
b
c
d
e
f

NOTE:
Dotted outline indicates parts not included in Model BP-5300TR.

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	–	Main Deck Ass'y		9-F
2	PU50535B	Take-up Brake Ass'y	Incl: (3)	9-D
3	PUM30001-47	Spring		8-E
4	PU50535A	Supply Brake Ass'y	Incl: (5), (6) and (108)	9-C
5	PUM30001-47	Spring		8-D
6	" -46	"		9-D
7	REE3000	E-Ring		8-E, 8-D
8	PU50545A	Cancel Lever Ass'y	Incl: (9)	5-E
9	PUM30001-48	Spring		5-D
10	REE3000	E-Ring		5-E
11	PU50547A	Back Tension Lever Ass'y	Incl: (12)	6-H
12	PUM30001-6	Spring		5-H
13	REE3000	E-Ring		5-H
14	PU48838B	Take-up Drive Ring Ass'y	Incl: (15)	5-F
15	PU35005-81	Spring		6-G
16	PU48837B	Supply Drive Ring Ass'y	Incl: (17)	5-F, 5-E
17	PU35005-81	Spring		4-F
18	PU48711	Pulley		5-F
19	PU50758	"		5-F
20	REE3000	E-Ring		5-G, 5-F
21	PU50552A	Slide Bar Ass'y	Incl: (22)	6-I
22	PUM30001-8	Spring		7-I
23	PUM30013	Flange Collar		7-I
24	SDST3006ZS	Screw		6-I
25	PU50554A	Pinch Roller Holder Ass'y		6-J
26	PU50559A	Pinch Roller Arm Ass'y	Incl: (27)	7-L
27	PUM30001-9	Spring		7-K
28	YFS3003S	Setscrew		7-L
29	PUM30002-3	Spring		7-K
30	PU50560	Pin		6-K
31	REE2500	E-Ring		6-J
32	Q03093-836	Washer		8-K
33	REE5000	E-Ring		7-K, 7-J
34	PU32855A	Tape Guide Arm Ass'y	Incl: (35)	4-I
35	PUM30001-7	Spring		5-I
36	PU30080-69	"		6-I
37	PUM30013-2	Flange Collar		6-I, 5-I
38	PU49276	Nylon Nut		4-I
39	PU32857	Solenoid Bracket		2-N, 1-N
⚠ 40	PU50542-2	Solenoid	Tape Guide (Reverse)	3-L
⚠ 41	PU50543	"	Pinch Roller	4-M
42	DPSP3005ZS	Screw		2-M, 1-M
43	PU50564	Solenoid Lever (1)		3-J
44	PU50565	" (2)		4-J
45	PUM30002-8	Spring		3-J
46	PU47327	Spacer		4-K, 2-K
47	PRE3008	Spring Pin		4-L
48	PU50566A	Cassette Door Guide Ass'y		2-K
49	PUM30001-12	Spring		1-K
50	LPSP3006ZS	Screw		1-L
51	PU50570	Dew Sensor		2-N
52	LPSP3006ZS	Screw		3-N
53	SBST3006ZS	"		2-L
54	REE2500	E-Ring		2-J
55	PU50575	Sensor Holder		4-F

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
56	PU49136	Sensor P.W.B.	End Sensor	3-E
57	PN202S	Photo Transistor		3-E
58	PU48973	Stopper		3-E
59	SBST3008ZS	Screw		4-E
60	PU50576	Photo Interrupter		10-E, 8-C
61	PU50653	Reel F.G. P.W.B.		10-E, 9-E, 7-C
62	SBST3008ZS	Screw		9-F, 7-C
63	PU50577A	Record Bracket Ass'y	Not used in BP-5300TR	6-D
64	SBST3006ZS	Screw	"	6-E
65	PU50579	Record Safety Lever	"	6-D
66	REE3000	E-Ring	"	6-D, 5-D
67	PU50382A	Switch Ass'y	"	6-C
68	SPSP2608Z	Screw	"	6-C
69	PU50581	Tension Arm		3-D
70	PU44852-2	Tension Pole		1-D
71	SSSP2605Z	Screw		2-E, 2-D
72	PU50582	Lever		1-E
73	LPSP3006ZS	Screw		1-E
74	BYS3006FS	Bolt		2-C
75	PUM30001-49	Spring		2-C
76	Q03093-830	Washer		3-D
77	REE1500	E-Ring		2-D
78	PU50583	Adjustment Lever		4-D
79	GBST3008ZS	Screw		4-D
80	PU50584-1A	Audio/Control Head Ass'y	BR-6400TR	3-J
"	" -2A	"	BP-5300TR	
81	PU50353	Head Circuit Board		2-J
82	PU50586A	Head Base Ass'y		4-H
83	PU30080-49	Spring		3-I
84	SPSP3008ZS	Screw		1-I
85	DPSP3008ZS	"		3-J
86	–	Sub-Deck Ass'y	See Sec. 7.10	3-F, 3-E
87	SBST3006ZS	Screw		3-H, 3-G, 2-H, 2-F
88	–	Drum Ass'y	See Sec. 7.11	1-F
89	LPSP3010ZS	Screw		1-H, 1-F
90	PU21144A	Center Lower Stay Ass'y	Incl: (91)	10-H
91	PU43147-2	Wire Saddle		9-I
92	–	–		
93	LPSP3008ZS	Screw		9-H, 8-J, 8-I
94	PU21508A	Left Side Bracket Ass'y	Incl: (95), (96) and (97)	4-B
95	PU49881	Edge Cover		4-D
96	PU48016-1	Mini Clamp		4-C
97	PU47876	P.W.B. Holder		7-B, 5-C
98	LPSP3008ZS	Screw		7-D
99	PU21146B-5	Center Bracket (A) Ass'y	Incl: (100) to (103)	6-N
100	PU43147-2	Wire Saddle		6-N, 6-K
101	PU43147-3	"		5-L
102	PU49881	Edge Cover		4-K
103	–	–		
104	SBST3006ZS	Screw		5-M, 5-L
105	PU50532A	Take-up Reel Disk Ass'y	Incl: (107) and (109)	9-C
106	PU50532B	Supply Reel Disk Ass'y	Incl: (107) and (109)	8-B, 7-B
107	YWS3003PS	Setscrew		9-B
108	PUM30001-7	Spring		8-D
109	40033400	Rubber Tire		9-C, 8-B

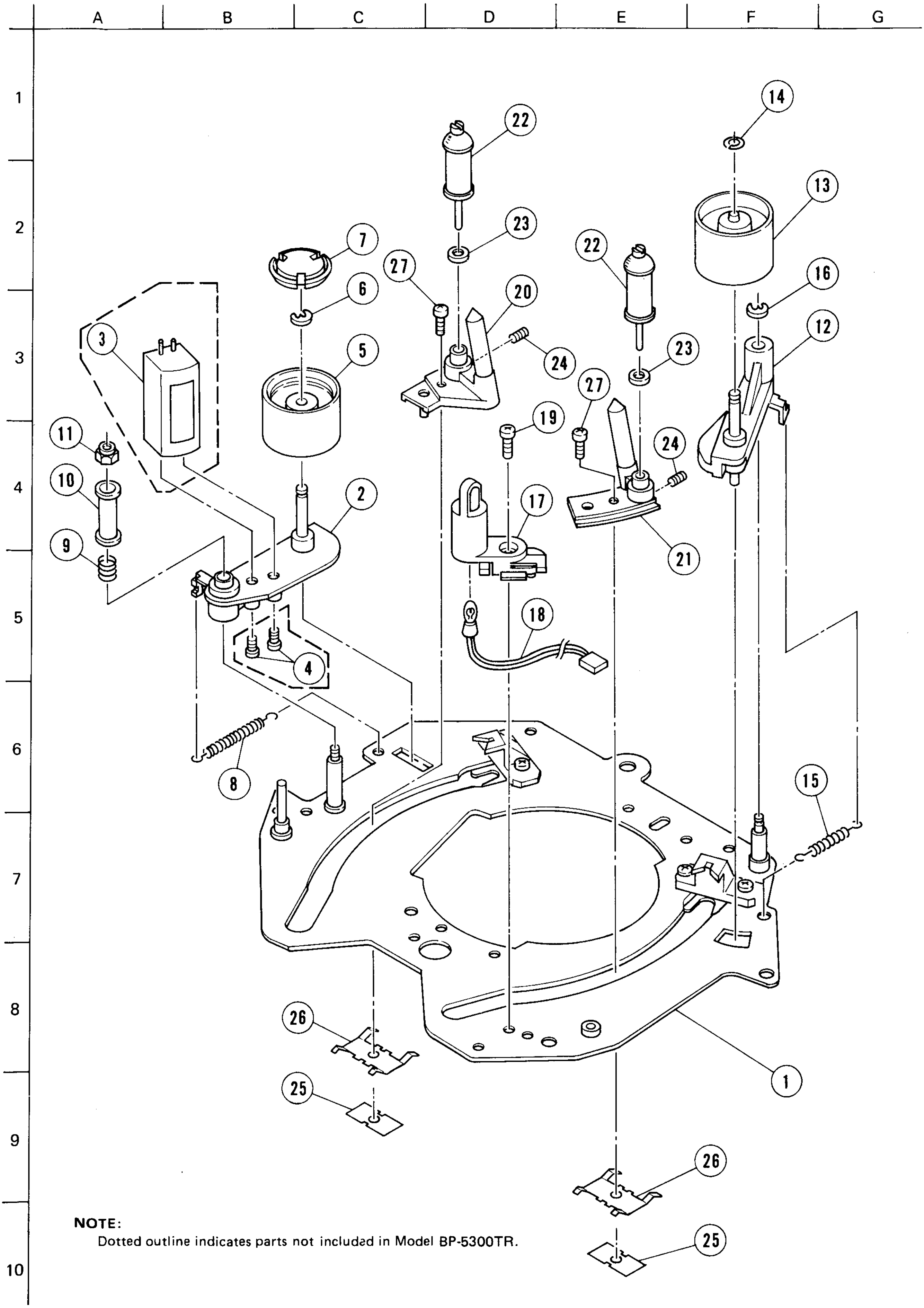
7.9 MAIN DECK-2 ASSEMBLY


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
10
1
31
30
29
40
a
a
a
25
28
32
40
26
24
11
41
38
36
37
23
33
21
42
17
15
9
27
14
39
35
5
8
16
22
18
6
13
34
7
a
a
3
4
10
5
2
12
5

7-14

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	PU50530	Capstan Motor		1-E
2	LPSP3008ZS	Screw		9-F
3	PU50531	Take-up Reel Motor		6-B
4	PU50531-2	Supply Reel Motor		8-K
5	LPSP3006ZS	Screw		9-E, 10-G
6	PU50538A	Connect Lever Ass'y	Incl: (7)	5-E
7	PUM30001-6	Spring		6-D
8	REE3000	E-Ring		5-D, 5-E, 8-E
⚠ 9	PU50542	Solenoid	Brake	4-C
10	DPSP3008ZS	Screw		8-E
⚠ 11	PU50544	Solenoid	Loading Tension	4-F
12	DPSP2608Z	Screw		10-F
13	PU50549A	Differential Transformer Ass'y		6-J
14	SBST3006ZS	Screw		5-I
15	PU50571A	Loading Drive Gear Ass'y	Incl: (16)–(21), (42)	4-L
16	PU50350	Belt		5-J
17	PU52745A	Loading Motor Ass'y		4-J
18	LPSP2604Z	Screw		5-L
19	–	–		
20	–	–		
21	QCF11HP-473	Ceramic Capacitor		4-J
22	SBST3006ZS	Screw		5-J
23	PU43981	Holder		4-K
24	SBST3008ZS	Screw		3-K
25	PU48952A	Switch Bracket Ass'y		3-I
26	QSM1S11-201	Microswitch	AL & UL Switches	3-H, 4-H
27	SPBP2316N	Screw		5-H
28	PU48955	Switch Lever		3-I
29	PU54172A	Pick-up Head Ass'y		2-I
30	DPSP3006ZS	Screw		1-H, 2-H
31	SBST3006ZS	"		1-I
32	PU48959A	Cassette Switch Bracket Ass'y	Incl: (33)–(38)	3-E
33	PU48960	Cassette Switch Bracket		4-E
34	PU48961-2	Shaft		6-E
35	PU48868-2	Slit Washer		5-E
36	QSM1S01-014	Microswitch		4-E
37	PU48969	Leaf Spring		4-E
38	SPBP2310N	Screw		4-D
39	SBST3006ZS	"		5-F
40	PU43147-2	Wire Saddle		2-G, 3-F
41	PU50259	Stand-off Clip		4-H
42	PU45811	Ferrite Beads		4-J

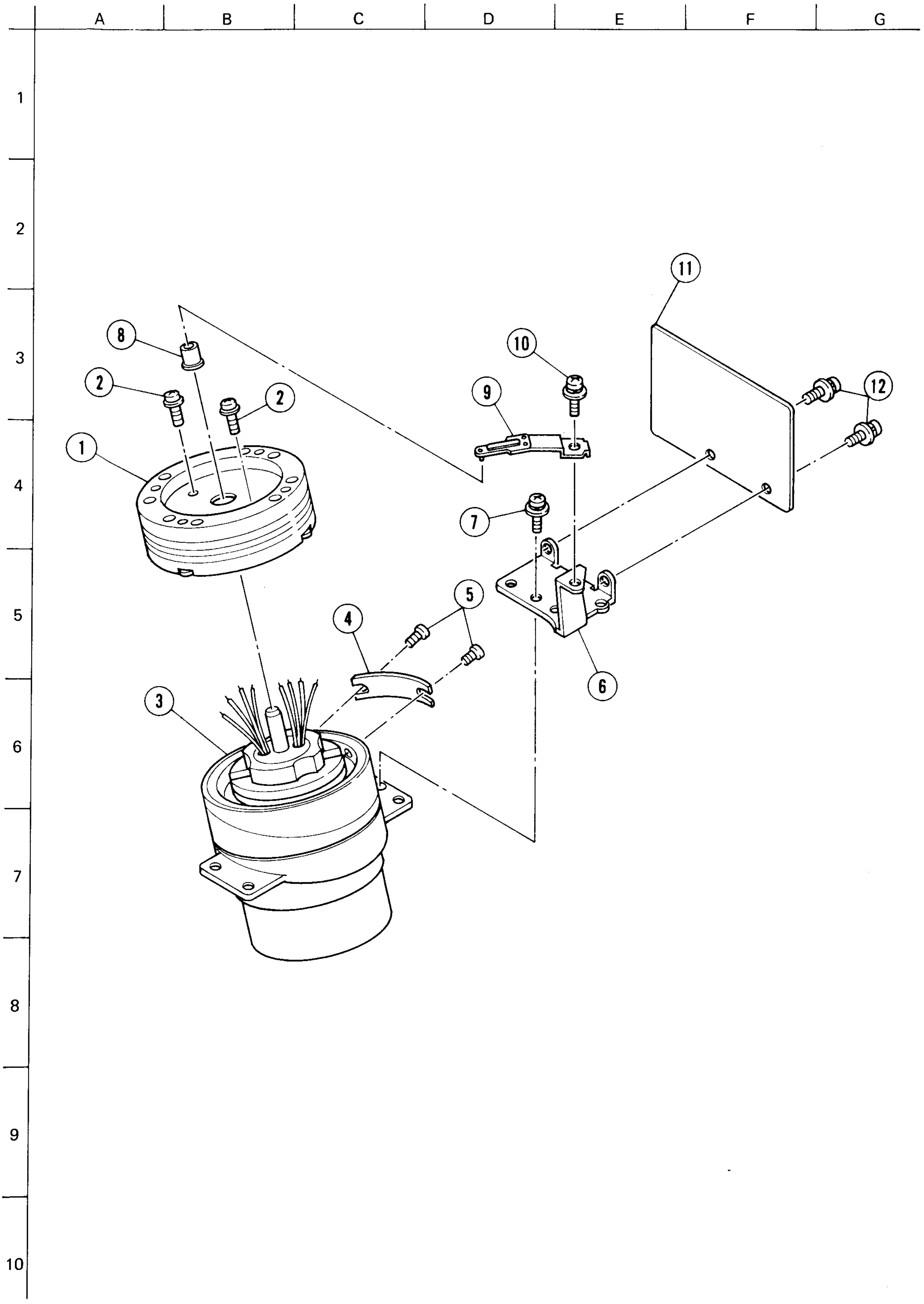
7.10 SUB DECK ASSEMBLY


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27

NOTE:
Dotted outline indicates parts not included in Model BP-5300TR.

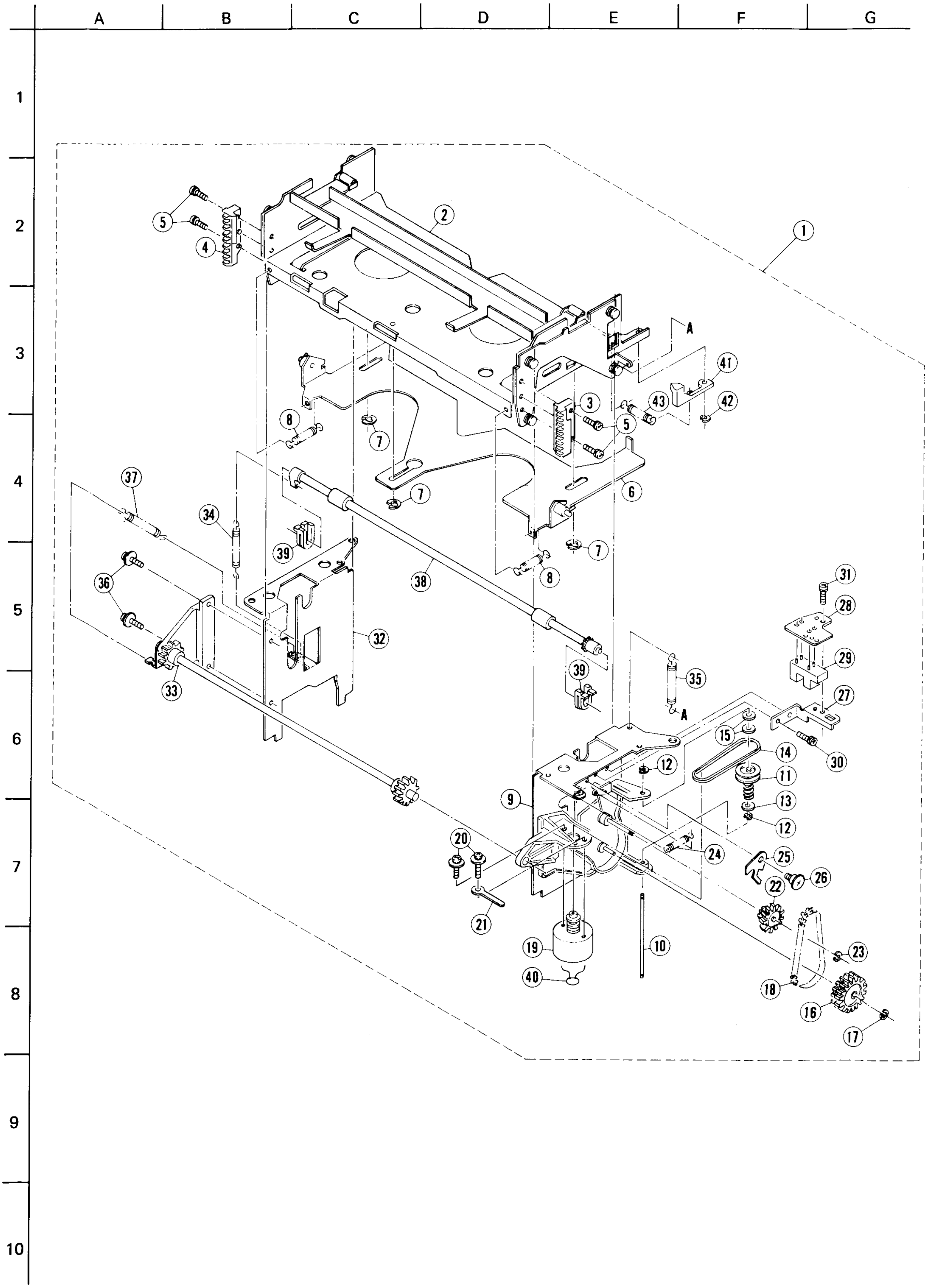
Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	PUS46309A	Sub-Deck Sub-Ass'y		9-F
2	PU49555A	Erase Head Arm Sub-Ass'y		4-C
3	PU47863	Full Erase Head	(BR-6400TR only)	3-A
4	LPSP2004Z	Screw	(" ")	5-C
5	PU51203A	Roller Ass'y		3-C
6	REE1500	E-Ring		3-C, 2-C
7	PU51204	Thrust Bearing		2-C
8	PUM30001-13	Spring		6-B
9	PU30080-69	"		4-A
10	PU48733	Guide Pole		4-A
11	PU49276	Nylon Nut		4-A
12	PU50592A	Roller Arm Ass'y		3-G
13	PU50540	Roller		2-G
14	PUM30017-1	Slit Washer		1-F
15	PUM30001-13	Spring		6-F
16	REE2500	E-Ring		2-G
17	PU48737	Lamp Holder		4-D
18	PU50594	Lamp		5-D
19	LPSP3006ZS	Screw		4-D, 3-D
20	PU48740B	Supply Pole Base Ass'y		3-D, 2-D
21	PU48745B	Take-up Pole Base Ass'y		5-F, 5-E
22	PU48748B	Guide Roller Ass'y		2-E, 1-D
23	PU48806-3	Rubber Tire		3-F, 3-E, 2-D
24	YFS3002.5FS	Setscrew		4-E, 3-E, 3-D
25	PU51638	Plate		9-F, 9-C, 9-B
26	PU51299	Spring Plate		10-F, 8-C, 8-B
27	SDSP2606Z	Screw		3-E, 2-C

7.11 DRUM ASSEMBLY


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
11
8
10
2
2
9
12
1
7
5
4
6
3

Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	PU20850H	Upper Drum Ass'y		4-A
2	NDBP3010N	Screw		3-B, 3-A
3	PUS26687A	Lower Drum Ass'y		6-A
4	PU48700A	Heater Ass'y		5-C
5	SDBP3004N	Screw		5-D
6	PU50595	Bracket		6-E
7	DPSP3006Z	Screw		4-D
8	PU49483	Commutator		3-A
9	PU48678A	Brush Ass'y		3-D
10	DPSP3006Z	Screw		3-D
11	–	V. Head Circuit board Ass'y	See Sec. 8.5.4.	2-F
12	DPSP3006Z	Screw		3-G

7.12 CASSETTE HOUSING ASSEMBLY


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
A

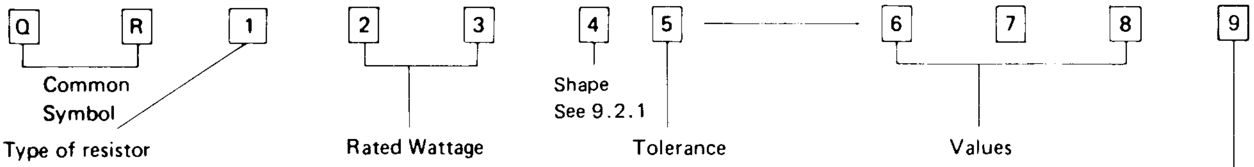
Symbol No.	Part No.	Part Name	Description	Symbol No. Position
1	PUS25912A	Cassette Housing Ass'y	Incl: (2) to (43)	2-F
2	PU20934A	Cassette Housing Sub Ass'y		2-D
3	PU49015	Rack Gear (R)		3-E
4	PU50436	" (L)		2-B
5	LPSP2006Z	Screw		2-A, 4-E
6	PU32446A	Slide Plate Ass'y		4-E
7	REE3000	E-Ring		4-C, 5-E
8	PU35005-17	Spring		4-B, 5-E
9	PU32543A	Guide Stay (R) Ass'y		7-D
10	PU49000	Shaft		8-E
11	PU49026	Worm		6-F
12	REE2000	E-Ring		7-F
13	Q03093-827	Washer		7-F
14	PU48941	Belt		6-F
15	Q03093-834	Washer		6-F
16	PU49851A	Sprocket Gear		8-G
17	REE2500	E-Ring		8-G
18	PU49031	Chain		8-F
19	PU49158B	Motor Ass'y		8-D
20	DPSP2606Z	Screw		7-D
21	PU49485-1	Wire Clamp		8-D
22	PU49032	Gear		7-F
23	REE2500	E-Ring		8-G
24	PUM30001-61	Spring		7-F
25	PU49030	Assistant Plate		7-F
26	PU50039	Fulcrum Screw		7-G
27	PU49028	Photo Interrupter Bracket		6-G
28	PU49029	Photo Interrupter Circuit Board		5-G
29	PU48923	Photo Interrupter		5-G
30	LPSP3004Z	Screw		6-G
31	LPSP2004Z	"		5-G
32	PU49033	Guide Stay (L)		5-C
33	PU32453A	Connect Gear Ass'y		6-B
34	PU35005-120	Spring		4-B
35	" -124	"		6-F
36	DPSP3006Z	Screw		5-A
37	PUM30001-4	Spring		4-A
38	PU49042A	Roller Ass'y		5-C
39	PU49046	Roller Bearing		5-B, 6-E
40	QCF11HP-473	C Cap		8-D
41	PU49656	Lid Opener		3-F
42	REE2500	E-Ring		3-F
43	PUM30001-65	Spring		3-E

SECTION 8
ELECTRICAL PARTS LIST

8.1 SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

8.2 FIXED RESISTOR CODING



C	Composition Resistor
D	Carbon Resistor
F	Unflammable Resistor
G	Oxide Metal Film Resistor
M	Metal Plate Resistor
X	Metal Film Resistor
W	Wire Wound Resistor
Y	Wire Wound Resistor
V	Metal Film Resistor, High Stability
Z	Special Resistor

Symbol	Rated wattage
16	1/6 (W)
18	1/8 "
14	1/4 "
12	1/2 "
01	1 "
02	2 "
03	3 "
04	4 "
05	5 "
06	6 "
07	7 "
75	7.5 "
08	8 "
10	10 "
15	15 "
20	20 "
30	30 "

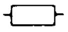
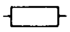
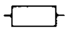
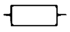
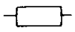
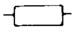
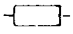
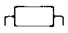
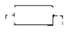
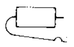
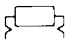
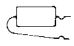
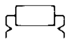
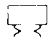
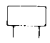
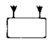
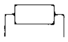
Symbol	Tolerance
F	±1 %
G	±2 %
J	±5 %
K	±10 %
M	±20 %

— Example —		
R47		0.47 Ω
4R7		4.7 Ω
470	47×10^0	47 Ω
471	47×10^1	470 Ω
472	47×10^2	4.7 KΩ
473	47×10^3	47 KΩ
474	47×10^4	470 KΩ
475	47×10^5	4.7 MΩ
10R2		10.2 Ω
1430	143×10^0	143 Ω
1581	158×10^1	1.58 KΩ

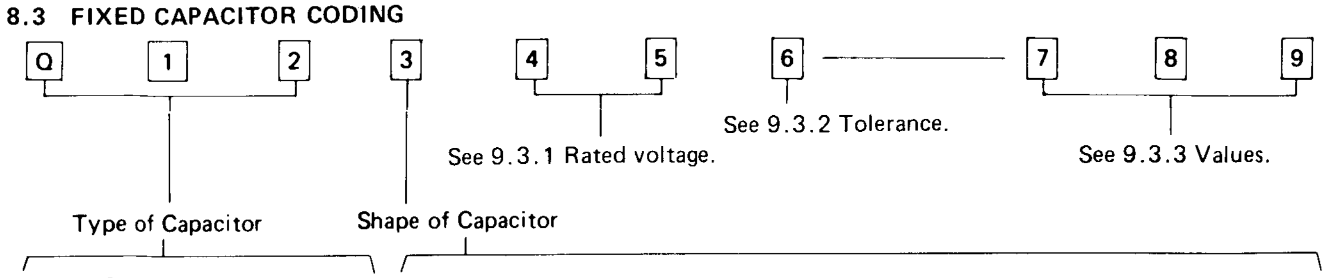
Size

Symbol	Size
A	Small Size
S	Small Size

8.2.1 Shape of resistor (■ : Flame retardant resistor)

Sort	C	D	G	F	M	W	X	Y	V
1									
2									
3									
4									
5						L type			
6						Resin Covered			
7						Enameled			
8									
9									

8.3 FIXED CAPACITOR CODING


Q
1
2
3
4
5
6
7
8
9
See 9.3.2 Tolerance.
See 9.3.1 Rated voltage.
See 9.3.3 Values.
Type of Capacitor
Shape of Capacitor

Ceramic Capacitors

Symbol	Type of Capacitor	Disk Lead	Kink Lead	
QCF	Ceramic	1	3	
QCS	"	1	3	
QCY	"	1, 4	3	
QCT	Temperature compensation			
QCZ	Special			

Electrolytic Capacitors

Symbol	Type of Capacitor	Tubular	Mono-direction	Anti-stress	Forming	Snap-in
QEA	Characteristic A	2	4			
QED	Characteristic D	2	4			
QEE	Tantalum		4	5		
QEE	" (small type)		8			
QEN	Non-polar	2	4	5	6	
QET	Characteristic W (small type)	2	4	5	6	
QEW	Characteristic W	2	4	5	6	7
QEZ	Special					

Paper Film Capacitors

Symbol	Type of Capacitor	Tubular	Normal		Flame retardant	
			Mono-direction	Kink Lead	Mono-direction	Kink Lead
QFF	Film mica		4			
QFH	Metalized mylar	2	4	3	5	6
QFM	Mylar	2	4	3, 7	5	6
QFN	" (small type)		4			
QFP	Polypropylene		4	3		
QFS	Polystyrole	2	4	3		
QFZ	Special					

8.3.1 Rated voltage

First letter \ 2nd letter	A	B	C	D	E	F	G	H	J	K	V	W	X
0						3.15			6.3				
1	10		16	20	25		40	50	63		35		
2	100	125	160	200	250	315	400	500	630		350	450	600
3	1000	1250		2000				5000					

8.3.2 Tolerance

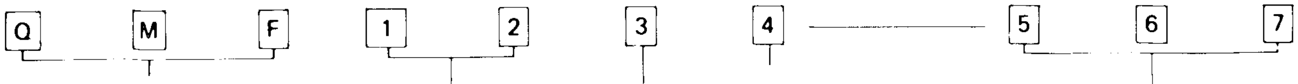
Symbol	F	G	J	K	M	Z	P	A	H	R
(%)	±1	±2	±5	±10	±20	+80 -20	+100 - 0	+100 - 10	+50 -10	+30 -10

8.3.3 Values

— Example — Values are in picofarads.

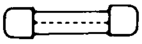
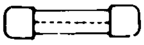
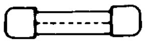
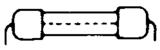
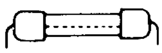
4R7		4.7 pF
470	47×10^0	47 pF
471	47×10^1	470 pF
472	47×10^2	4,700 pF = 0.0047 μF
473	47×10^3	47,000 pF = 0.047 μF
474	47×10^4	470,000 pF = 0.47 μF
475	47×10^5	4,700,000 pF = 4.7 μF

8.4 FUSE CODING



COMMON SYMBOL

Shape of Fuse

Symbol No.	Shape	Remarks
51		ϕ 5.2 x 20
60		ϕ 6.4 x 30
61		ϕ 6.35 x 31.8
63		With 60 Lead Wire
66		With 61 Lead Wire

Rated Voltage

Symbol No.	Rated Voltage
1	AC 125 V
2	AC 250 V

Values

R10	0.1 A
R125	0.125 A
1R0	1.0 A
1R2	1.2 A
1R25	1.25 A
100	10 A

Characteristics

Symbol No.	Fusing current	Fusing time	Remarks
S	160%	Within 1 hr.	Anti-rush Type
	200%	" 2 min.	
	700%–2000%	" 0.01 sec.	
R	160%	" 1 hr.	Regular Fusible Type
	200%	" 2 min.	
M	135%	" 1 hr.	Regular Fusible Type (for UL)
	200%	" 2 min.	
U	135%	" 1 hr.	Anti-rush Type (for UL)
	200%	" 2 min.	
	800%–2000%	" 0.01 sec.	
A	210%	" 2 min.	Anti-rush Type (for Europe)
	275%	0.5 – 10 sec.	
	400%	0.15 – 2 sec.	
	1000%	0.02 – 0.3 sec.	
B	210%	Within 30 min.	Regular Fusible Type (for SEMKO, Europe)
	275%	0.05 – 2 sec.	
	400%	0.01 – 0.3 sec.	

8.5 ELECTRICAL PARTS LIST

8.5.1 PAL & NTSC Color Amp. Circuit Board Ass'y

1 0 BR-6400TR ....⚠ PU21426A
BP-5300TR ....⚠ PU21426B

Symbol No.	Part No.	Part Name	Description
IC 1	AN6360	Integrated Circuit	
IC 2	TA7347P	"	
★ IC 3	AN607P	"	
IC 4	"	"	
IC 5	TA7347P	"	
IC 6	"	"	
IC 7	AN6371	"	
IC 8	TA7347P	"	
IC 9	AN6363	"	
IC10	BA7007	"	
IC11	AN6362	"	
★ Q 1	2SC2647C	Transistor	
★ Q 2	"	"	
Q 3	"	"	
Q 4	"	"	
★ Q 5	"	"	
★ Q 6	"	"	
★ Q 7	"	"	
★ Q 8	"	"	
Q 9	"	"	
Q10	"	"	
Q11	2SB641Q	"	
Q12	2SC2647C	"	
Q13	"	"	
Q14	"	"	
Q15	"	"	
Q16	"	"	
Q17	"	"	
Q18	2SB641Q	"	
Q19	"	"	
Q20	2SC2647C	"	
Q21	"	"	
Q22	"	"	
Q23	"	"	
D 1	1SS133	Diode	
D 2	RD9.1EB3	Zener Diode	
D 3	–	–	
★ D 4	1SS133	Diode	
D 5	–	–	
D 6	1SS133	Diode	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
★ D11	"	"	
D12	"	"	
D13	–	–	
D14	1SS133	Diode	
★ D15	"	"	
D16	"	"	
D17	"	"	
D18	"	"	
D19	"	"	
D20	"	"	
D21	RD5.6EB3	Zener Diode	
D22	RD3.6EB1	"	
D23	1SS133	Diode	
D24	"	"	
*D25	"	"	
D26	1SS133	Diode	
D27	"	"	
★ R 1	QRD167J-681	CR	
★ R 2	" -682	"	
★ R 3	" -183	"	
R 4	–	–	
★ R 5	QRD167J-391	CR	
★ R 6	" -102	"	
★ R 7	" -681	"	
★ R 8	" -122	"	
★ R 9	" -223	"	
★ R10	" -103	"	
R11	" -684	"	
R12	" -224	"	
R13	" -472	"	
R14	" -105	"	
★ R15	" -102	"	
R16	" -122	"	
R17	" -182	"	
R18	" -102	"	
R19	" -392	"	
R20	" -221	"	
R21	" -332	"	
R22	" -102	"	
R23	" -223	"	
R24	" -563	"	
★ R25	" -471	"	
★ R26	" -222	"	
★ R27	" -471	"	
★ R28	" -181	"	
★ R29	" -272	"	
★ R30	" -181	"	
★ R31	" -102	"	
★ R32	" -222	"	
★ R33	" -103	"	
★ R34	" -472	"	
★ R35	" -223	"	
★ R36	" -102	"	
★ R37	" -272	"	
★ R38	" -103	"	
★ R39	" -223	"	
★ R40	" -332	"	
R41	" -221	"	
R42	" -152	"	
R43	" -391	"	
R44	" -391	"	
R45	" -392	"	
R46	" -332	"	
R47	" -102	"	
R48	" -122	"	
R49	" -103	"	
R50	" -333	"	
R51	" -122	"	
R52	" -152	"	
R53	QVP4A0B-681	VR	
R54	QRD167J-122	CR	
R55	" -103	"	
R56	" -223	"	
R57	" -391	"	
R58	" -471	"	
R59	" -391	"	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
R60	QRD167J-391	CR	
R61	″ -223	″	
R62	″ -221	″	
R63	″ -152	″	
R64	″ -102	″	
R65	″ -561	″	
R66	″ -332	″	
R67	″ -223	″	
R68	″ -563	″	
R69	″ -393	″	
R70	″ -103	″	
R71	″ -152	″	
R72	″ -102	″	
R73	″ -391	″	
R74	″ -223	″	
R75	″ -563	″	
R76	″ -102	″	
R77	″ -563	″	
R78	″ -184	″	
R79	″ -122	″	
R80	″ -102	″	
R81	″ -472	″	
R82	″ -182	″	
R83	–	″	
R84	QRD167J-394	″	
R85	″ -222	″	
R86	″ -223	″	
R87	″ -563	″	
R88	″ -102	″	
R89	″ -471	″	
R90	″ -122	″	
R91	″ -472	″	
R92	QVP4A0B-102	VR	
⚠ R93	QRD121J-391	CR	
R94	QRD167J-102	″	
R95	″ -562	″	
★ R96	″ -123	″	
R97	″ -471	″	
R98	″ -102	″	
R99	″ -562	″	
R100	″ -221	″	
R101	″ -221	″	
R102	″ -122	″	
R103	″ -102	″	
R104	″ -102	″	
R105	″ -103	″	
R106	″ -103	″	
R107	″ -103	″	
R108	″ -222	″	
R109	″ -222	″	
R110	″ -221	″	
R111	″ -563	″	
R112	″ -332	″	
R113	″ -102	″	
R114	″ -103	″	
R115	″ -102	″	
R116	″ -222	″	
R117	″ -154	″	
R118	–	–	
R119	QRD167J-122	CR	
R120	″ -563	″	
R121	″ -332	″	
R122	–	–	

Symbol No.	Part No.	Part Name	Description
R123	QRD167J-103	CR	
R124	″ -223	″	
R125	″ -103	″	
R126	″ -472	″	
R127	″ -562	″	
R128	″ -472	″	
R129	″ -103	″	
R130	″ -562	″	
R131	″ -102	″	
R132	″ -471	″	
R133	″ -122	″	
R134	″ -472	″	
R135	QVP4A0B-471	VR	
R136	QRD121J-681	CR	
R137	QRD167J-222	″	
R138	″ -562	″	
★ R139	″ -123	″	
R140	″ -471	″	
R141	″ -102	″	
R142	″ -562	″	
R143	QVP4A0B-102	VR	
R144	QRD167J-103	CR	
R145	″ -103	″	
★ C 1	QCS11HJ-560	C Cap	
★ C 2	″ -560	″	
★ C 3	″ -101	″	
★ C 4	QFN41HK-103	MY Cap	
★ C 5	QCF11EZ-223	C Cap	
★ C 6	QEK41CM-476	E Cap	
★ C 7	QFN41HK-103	MY Cap	
★ C 8	QEK41CM-476	E Cap	
C 9	″ -106	″	
C10	QFN41HK-103	MY Cap	
C11	″ -103	″	
C12	QEK41CM-106	E Cap	
C13	QCF11EZ-102	C Cap	
C14	″ -223	″	
C15	QFN41HK-223	MY Cap	
C16	″ -333	″	
C17	QCS11HJ-560	C Cap	
C18	QFN41HK-103	MY Cap	
C19	QCS11HJ-5R0	C Cap	
C20	QFN41HK-103	MY Cap	
C21	QCF11EZ-223	C Cap	
C22	QEK41CM-476	E Cap	
C23	QFN41HK-223	MY Cap	
C24	″ -223	″	
C25	QEK41CM-476	E Cap	
C26	QCF11EZ-223	C Cap	
C27	″ -223	″	
C28	″ -223	″	
C29	QFN41HK-103	MY Cap	
★ C30	QCS11HJ-101	C Cap	
★ C31	QEK41CM-476	E Cap	
★ C32	QCF11EZ-223	C Cap	
★ C33	QFN41HK-223	MY Cap	
★ C34	″ -223	″	
★ C35	″ -223	″	
C36	QCF11EZ-223	C Cap	
C37	QEK41CM-476	E Cap	
C38	″ -476	″	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
C39	QCF11EZ-223	C Cap	
C40	QFN41HK-103	MY Cap	
C41	" -103	"	
C42	QCS11HJ-101	C Cap	
C43	QFN41HK-103	MY Cap	
C44	QCF11EZ-223	C Cap	
C45	QEK41CM-476	E Cap	
C46	QFN41HK-103	MY Cap	
C47	" -103	"	
C48	QCF11EZ-223	C Cap	
C49	QFN41HK-103	MY Cap	
C50	" -103	"	
C51	QCF11EZ-223	C Cap	
C52	QEK41CM-476	E Cap	
C53	QCF11EZ-223	C Cap	
C54	QAT3001-015	TR Cap	
C55	QCS11HJ-120	C Cap	
C56	" -121	"	
C57	" -121	"	
C58	QCF11EZ-223	"	
C59	QEK41CM-476	E Cap	
C60	QFN41HK-103	MY Cap	
C61	" -103	"	
C62	QCF11EZ-223	C Cap	
C63	" -223	"	
C64	QEK41CM-476	E Cap	
C65	QCF11EZ-223	C Cap	
C66	QFN41HK-103	MY Cap	
C67	QEK41HM-225	E Cap	
C68	QFN41HK-103	MY Cap	
C69	" -103	"	
C70	QCS11HJ-150	C Cap	
C71	" -101	"	
C72	QCF11EZ-223	"	
C73	QEK41CM-476	E Cap	
C74	QCF11EZ-223	C Cap	
C75	QFN41HK-103	MY Cap	
C76	QCS11HJ-220	C Cap	
C77	" -6R0	"	
C78	QAT3001-015	TR Cap	
C79	QCS11HJ-4R0	C Cap	
C80	QFN41HK-103	MY Cap	
C81	" -393	"	
C82	QEK41CM-106	E Cap	
C83	QCF11EZ-223	C Cap	
C84	" -223	"	
C85	QEK41CM-476	E Cap	
C86	QCF11EZ-223	C Cap	
C87	QFN41HK-103	MY Cap	
C88	QCS11HJ-221	C Cap	
C89	QCT05CH-181	"	
C90	" -151	"	
C91	QFN41HK-183	MY Cap	
C92	QEK41CM-106	E Cap	
C93	QFN41HK-102	MY Cap	
C94	QEK41HM-105	E Cap	
C95	QCF11EZ-102	C Cap	
C96	QFN41HK-104	MY Cap	
C97	QEK41HM-105	E Cap	
C98	QCF11EZ-223	C Cap	
C99	QEK41CM-476	E Cap	
C100	QCF11EZ-223	C Cap	
C101	QEK41CM-476	E Cap	

Symbol No.	Part No.	Part Name	Description
C102	QFN41HJ-123	MY Cap	
C103	QCS11HJ-820	C Cap	
C104	" -270	"	
C105	QCF11EZ-223	"	
C106	QEK41CM-476	E Cap	
C107	QCS11HJ-221	C Cap	
C108	QEK41CM-106	E Cap	
C109	QFN41HK-103	MY Cap	
C110	QET41CM-107	E Cap	
C111	QCF11EZ-223	C Cap	
C112	QEK41CM-336	E Cap	
C113	QCF11EZ-223	C Cap	
C114	QEK41CM-476	E Cap	
C115	" -106	"	
C116	QCF11EZ-223	C Cap	
C117	QEK41CM-476	E Cap	
C118	QCS11HJ-391	C Cap	
C119	" -391	"	
C120	" -560	"	
C121	QEK41CM-476	E Cap	
C122	QCF11EZ-223	C Cap	
C123	QFN41HK-103	MY Cap	
C124	QCS11HJ-221	C Cap	
C125	QCT05CH-181	"	
C126	" -121	"	
C127	QFN41HK-183	MY Cap	
C128	QEK41CM-106	E Cap	
C129	QFN41HK-102	MY Cap	
C130	QEK41HM-105	E Cap	
C131	QCF11EZ-102	C Cap	
C132	QFN41HK-104	MY Cap	
C133	QEK41HM-105	E Cap	
C134	QEK41CM-105	"	
C135	QCF11EZ-223	C Cap	
C136	" -223	"	
C137	QEK41CM-476	E Cap	
⚠★ L 1	PU48530-221K	Peaking Coil	
⚠ L 2	" -221K	"	
⚠ L 3	" -221K	"	
⚠ L 4	" -221K	"	
⚠ L 5	" -221K	"	
L 6	PU46398-2	Coil	
L 7	PU46003-6R8	"	
⚠ L 8	PU48530-221K	Peaking Coil	
⚠ L 9	" -221K	"	
⚠ L10	" -221K	"	
L11	" -560K	"	
⚠ L12	" -221K	"	
L13	" -820K	"	
L14	" -560K	"	
⚠ L15	" -221K	"	
L16	" -101K	"	
⚠ L17	" -221K	"	
L18	PU30771-6	Coil	
⚠ L19	PU48530-221K	Peaking Coil	
L20	PU30771-6	Coil	
⚠ L21	PU48530-221K	Peaking Coil	
L22	PU30771-5	Coil	
⚠ L23	PU48530-221K	Peaking Coil	
⚠ L24	" -221K	"	
L25	" -101K	"	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
⚠ L26	PU48530-221K	Peaking Coil	
⚠ L27	" -221K	"	
★ BPF 1	PU48516-2	B.P.F.	
BPF 2	PU32489	"	
BPF 3	PU49465	"	
★ LPF 1	PU48517-2	L.P.F.	
EQ 1	PU48515-2	Equalizer	
X 1	PU31449-4	Crystal	
X 2	PU42746	"	
DL 1	PU49410	Delay Line	
DL 2	PU46321-4M	"	
LC 1	PU49057	LC Block	
CF 1	PU46521	C.F.	
P101	PU43351-4	Cap. Housing	
P102	" -2	"	
P103	" -7	"	
P104	" -9R	"	
P105	" -2Y	"	
P106	" -9	"	
P107	" -4Y	"	
	QWY122-020	BUS WIRE	
	PU50766	Test Pin	
	PU54717	SUB 1 PWB	
Q24	2SC2647C	TRANSISTOR	
C138	QFN41HK-223	M Cap	
R146	QRD167J-331	CR	
R147	" -471	"	
R148	" -223	"	
R149	" -103	"	
B 2	V44611-001	BUS WIRE	
J28	QWY122-020	"	
J29	" -020	"	
	PU54718	SUB 2 PWB	
Q25	2SC2647C	TR	
R150	QRD167J-332	CR	
R151	" -223	"	
R152	" -103	"	
R153	" -392	"	
J30	QWY122-020	BUS WIRE	
J31	" -020	"	

8.5.2 Luminance (Y) Amp. Circuit Board Ass'y $\boxed{1}\boxed{1}$

BR-6400TR .... ⚠ PU21427A
BP-5300TR .... ⚠ PU21427B

Symbol No.	Part No.	Part Name	Description
★ IC 1	AN6310	Integrated Circuit	
★ IC 2	TA7347P	"	
★ IC 3	VC2011	"	
IC 4	"	"	
IC 5	10VT13	"	
IC 6	TA7347P	"	
IC 7	HA11703	"	
★ Q 1	2SC2647C	Transistor	
★ Q 2	"	"	
★ Q 3	"	"	
★ Q 4	2SD638R	"	
★ Q 5	2SC2647C	"	
★ Q 6	"	"	
★ Q 7	"	"	
Q 8	"	"	
Q 9	"	"	
Q10	2SD638R	"	
Q11	2SB641Q	"	
Q12	2SC2647C	"	
Q13	"	"	
Q14	"	"	
Q15	–	–	
Q16	2SC2647C	Transistor	
Q17	2SB641Q	"	
Q18	2SC2647C	"	
★ Q19	"	"	
Q20	"	"	
Q21	2SD638R	"	
Q22	"	"	
Q23	2SC2647C	"	
Q24	2SD638R	"	
★ D 1	1SS133	Diode	
D 2	"	"	
D 3	1S1926-M	"	
D 4	"	"	
D 5	1SS133	"	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	"	"	
D12	OA91	"	
D13	1SS133	"	
D14	"	"	
D15	"	"	
D16	"	"	
D17	–	–	
★ D18	1SS133	Diode	
★ R 1	QRD167J-562	CR	
★ R 2	QVP4A0B-472	VR	
★ R 3	QRD167J-123	CR	
★ R 4	" -123	"	
★ R 5	QVP4A0B-103	VR	
★ R 6	QRD167J-392	CR	
★ R 7	" -332	"	
★ R 8	" -153	"	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
★R 9	QVP4A0B-473	VR	
★R10	QRD167J-153	CR	
★R11	" -152	"	
★R12	" -102	"	
★R13	" -472	"	
★R14	" -122	"	
★R15	" -222	"	
★R16	QRV143F-3320	CMF R	
R17	–	–	
★R18	QRD167J-222	CR	
★R19	" -332	"	
★R20	" -124	"	
★R21	" -103	"	
★R22	QVP4A0B-104	VR	
★R23	QRD167J-471	CR	
★R24	" -471	"	
★R25	" -332	"	
★R26	" -391	"	
★R27	" -680	"	
★R28	" -102	"	
★R29	" -680	"	
★R30	" -391	"	
★R31	QVP4A0B-222	VR	
★R32	QRD167J-391	CR	
★R33	" -680	"	
★R34	" -102	"	
★R35	" -680	"	
★R36	" -391	"	
★R37	QVP4A0B-222	VR	
★R38	QRD167J-223	CR	
R39	–	–	
★R40	QRD167J-102	CR	
★R41	" -102	"	
★R42	" -223	"	
★R43	" -223	"	
★R44	" -222	"	
R45	" -681	"	
R46	" -681	"	
R47	" -682	"	
R48	" -222	"	
R49	" -102	"	
R50	" -221	"	
R51	" -562	"	
R52	" -333	"	
R53	" -121	"	
R54	" -222	"	
R55	" -471	"	
R56	" -103	"	
R57	" -103	"	
R58	QRV143F-1690	CMF R	
R59	QRD167J-681	CR	
R60	" -223	"	
R61	" -563	"	
R62	QVP4A0B-222	VR	
R63	QRD167J-391	CR	
R64	" -680	"	
R65	" -102	"	
R66	" -680	"	
R67	" -391	"	
R68	QVP4A0B-222	VR	
R69	QRD167J-391	CR	
R70	" -680	"	
R71	" -102	"	

Symbol No.	Part No.	Part Name	Description
R72	QRD167J-680	CR	
R73	" -391	"	
R74	QRV143F-2671	CMF R	
R75	QRD167J-102	CR	
R76	–	–	
R77	QRV143F-5620	CMF R	
R78	QRD167J-562	CR	
R79	" -123	"	
R80	" -562	"	
R81	" -122	"	
R82	" -122	"	
R83	QVP4A0B-102	VR	
R84	QRD167J-102	CR	
R85	" -331	"	
R86	QVP4A0B-102	VR	
R87	QRD167J-332	CR	
R88	" -332	"	
R89	" -184	"	
★R90	" -472	"	
★R91	QVP4A0B-472	VR	
★R92	QRD167J-122	CR	
R93	" -681	"	
R94	" -102	"	
R95	" -123	"	
R96	" -333	"	
R97	QVP4A0B-472	VR	
R98	QRD167J-103	CR	
R99	" -563	"	
R100	" -562	"	
R101	" -4R7	"	
R102	" -4R7	"	
R103	" -102	"	
R104	" -562	"	
R105	" -682	"	
R106	" -104	"	
R107	" -103	"	
★R108	" -562	"	
★R109	" -101	"	
R110	–	–	
★R111	QRD167J-123	CR	
R112	" -223	"	
⚠R113	" -330	"	
⚠R114	QRG129J-820	FR	
R115	QRD167J-222	CR	
R116	" -123	"	
R117	" -102	"	
R118	" -750	"	
R119	" -750	"	
R120	" -561	"	
R121	" -470	"	
R122	" -820	"	
R123	" -560	"	
R124	" -681	"	
R125	" -122	"	
R126	" -561	"	
R127	" -472	"	
R128	" -561	"	
R129	" -102	"	
R130	V44611-001	Bus Wire	
★R131	" -001	"	
R132	" -001	"	
R133	" -001	"	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
C 1	–	–	
★C 2	QCF11EZ-223	C Cap	
★C 3	QET41CM-107	E Cap	
★C 4	QCF11EZ-223	C Cap	
★C 5	QCT05CH-680	"	
★C 6	QAT3001-017	TR Cap	
★C 7	QEK41HM-474	E Cap	
★C 8	QET41AM-107	"	
★C 9	QCF11EZ-223	C Cap	
★C10	QET41CM-107	E Cap	
★C11	QCF11EZ-223	C Cap	
★C12	PU51163-471	"	
★C13	QCS11HJ-680	"	
C14	–	–	
★C15	QCF11EZ-223	C Cap	
★C16	QFN41HK-473	MY Cap	
★C17	QEK41EM-335	E Cap	
★C18	QFN41HK-683	MY Cap	
★C19	QEN40JM-477	NP Cap	
★C20	QEK41CM-476	E Cap	
★C21	QCS11HJ-151	C Cap	
★C22	QCF11EZ-223	"	
★C23	QEK41CM-476	E Cap	
★C24	QET41CM-107	"	
★C25	QCF11EZ-223	C Cap	
★C26	QET41CM-107	E Cap	
★C27	QCF11EZ-223	C Cap	
★C28	QEK41CM-476	E Cap	
★C29	QET41CM-476	"	
★C30	QCF11EZ-223	C Cap	
★C31	QEK41CM-476	E Cap	
★C32	" -476	"	
★C33	QET41CM-107	"	
★C34	" -107	"	
★C35	QCF11EZ-223	C Cap	
★C36	" -223	"	
★C37	QFN41HK-103	MY Cap	
★C38	QEK41CM-476	E Cap	
★C39	QCF11EZ-223	C Cap	
★C40	QFN41HK-103	MY Cap	
★C41	" -103	"	
C42	QCS11HJ-390	C Cap	
C43	" -221	"	
C44	QET41CM-107	E Cap	
C45	QCF11EZ-223	C Cap	
C46	QEK41CM-476	E Cap	
C47	QET41CM-107	"	
C48	QCS11HJ-121	C Cap	
C49	QCF11EZ-223	"	
C50	QET41CM-107	E Cap	
C51	" -107	"	
C52	QEK41CM-476	"	
C53	QCF11EZ-223	C Cap	
C54	QEK41CM-476	E Cap	
C55	QEK41HM-105	"	
C56	QEK41CM-476	"	
C57	QCF11EZ-223	C Cap	
C58	QEK41HM-105	E Cap	
C59	QCS11HJ-331	C Cap	
C60	QEK41HM-105	E Cap	
C61	QCF11EZ-223	C Cap	
C62	QET41CM-107	E Cap	
C63	QCF11EZ-223	C Cap	

Symbol No.	Part No.	Part Name	Description
C64	QET41CM-107	E Cap	
C65	" -107	"	
C66	–	–	
C67	QEK41CM-476	E Cap	
C68	" -476	"	
C69	QCF11EZ-223	C Cap	
C70	QET41CM-107	E Cap	
C71	QCS11HJ-270	C Cap	
C72	PU51163-331	"	
C73	QCS11HJ-560	"	
C74	" -270	"	
★C75	QCF11EZ-223	"	
C76	QET41CM-107	E Cap	
C77	QEK41HM-105	"	
C78	QEK41CM-476	"	
★C79	" -476	"	
C80	" -476	"	
C81	QCF11EZ-223	C Cap	
C82	" -223	"	
C83	QCS11HJ-180	"	
C84	" -121	"	
C85	" -180	"	
C86	QFN41HK-103	MY Cap	
C87	QFN41HK-103	"	
C88	QCF11EZ-223	C Cap	
C89	" -223	"	
C90	QET41CM-227	E Cap	
C91	QEK41CM-476	"	
C92	" -476	"	
C93	QEK41HM-105	"	
C94	QCF11EZ-223	C Cap	
C95	QET41CM-107	E Cap	
C96	QEK41CM-106	"	
C97	" -106	"	
C98	QET40JM-227	"	
C99	QCF11EZ-223	C Cap	
C100	QET41CM-107	E Cap	
C101	QCS11HJ-150	C Cap	
C102	QEK41CM-476	E Cap	
C103	QET40JM-228	"	
C104	QCF11EZ-223	C Cap	
C105	QET41CM-107	E Cap	
C106	QET40JM-227	"	
C107	QCF11EZ-223	C Cap	
C108	QEK41CM-476	E Cap	
C109	QCS11HJ-560	C Cap	
C110	QET41CM-107	E Cap	
C111	QCF11EZ-223	C Cap	
C112	QET41CM-107	E Cap	
C113	QCF11EZ-223	C Cap	
C114	" -223	"	
⚠★L 1	PU48530-221K	Peaking Coil	
L 2	–	–	
★L 3	PU48530-120K	Peaking Coil	
⚠★L 4	" -221K	"	
⚠★L 5	" -221K	"	
⚠★L 6	" -221K	"	
⚠★L 7	" -221K	"	
L 8	" -220K	"	
⚠L 9	" -221K	"	
⚠L10	" 221K	"	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
⚠L11	PU48530-221K	Peaking Coil	
⚠L12	" -221K	"	
⚠L13	" -221K	"	
⚠L14	" -221K	"	
⚠L15	" -221K	"	
⚠L16	" -221K	"	
⚠L17	" -221K	"	
L18	" -1R0K	"	
L19	" -680K	"	
⚠L20	" -221K	"	
★LPF 1	PU54128	L.P.F.	
★LPF 2	PU54130	"	
LPF 3	"	"	
LPF 4	PU54128	"	
★HPF 1	PU54132	H.P.F.	
★EQ 1	PU54129	Equalizer	
★EQ 2	PU54131	"	
EQ 3	"	"	
EQ 4	PU54129	"	
EQ 5	PU31933-6	"	
P111	PU43351-5	Cap. Housing	
★P112	" -2	"	
P113	" -7	"	
P114	" -4R	"	
P115	" -6Y	"	
P116	" -8R	"	
P117	" -6	"	
P118	" -4Y	"	
	PU50766	Test Pin	TP6–TP11
	ML-PU2149	Y. P.W.B. Wire	
	PU43192-4	Binder	
P119	PU43351-2R	CAP HOUSING	
	PU54837	HPF 1 PWB	
L 21	PU48530-680K		
L 22	" -221K		
C114	QCS11HJ-121		
C115	" -121		

★ symbol : Not used in BP-5300TR

8.5.3 Pre/Rec Board Ass'y 1 3

BR-6400TR .... ⚠ PU21428A
BP-5300TR .... ⚠ PU21428B

Symbol No.	Part No.	Part Name	Description
★IC 1	EHM822A29	Integrated Circuit	
IC 2	AN6330	"	
IC 3	TA7347P	"	
IC 4	"	"	
IC 5	HA11702	"	
IC 6	AN6330	"	
IC 7	AN607P	"	
IC 8	VC2011	"	
★Q 1	2SC2647C	Transistor	
★Q 2	2SB745S	"	
★Q 3	"	"	
Q 4	2SC2647C	"	
Q 5	"	"	
Q 6	2SC941Y	"	
Q 7	"	"	
Q 8	2SC2647C	"	
Q 9	2SC2647C	"	
Q10	"	"	
Q11	"	"	
Q12	"	"	
Q13	"	"	
Q14	"	"	
Q15	"	"	
Q16	2SC941Y	"	
Q17	"	"	
Q18	2SB641Q	"	
Q19	2SC2647C	"	
Q20	"	"	
Q21	2SB745S	"	
Q22	2SC2647C	"	
Q23	"	"	
Q24	"	"	
D 1	ERB12-02	Diode	
D 2	"	"	
★D 3	"	"	
D 4	MA27WA	"	
D 5	RD6.2EB2	Zener Diode	
★R 1	QVP4A0B-222	VR	
★R 2	" -222	"	
★R 3	" -222	"	
★R 4	QRD167J-182	CR	
★R 5	" -222	"	
★R 6	" -391	"	
★R 7	" -472	"	
R 8	—	—	
★R 9	QRD167J-222	CR	
★R10	" -223	"	
★R11	" -223	"	
★R12	" -562	"	
★R13	" -472	"	
★R14	" -151	"	
★R15	QVP4A0B-221	VR	
R16	QRD181J-1R0	CR	
R17	" -1R0	"	
R18	QRD167J-152	"	
R19	" -223	"	
R20	" -223	"	

★symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
R21	QRD167J-103	CR	
R22	" -152	"	
R23	" -273	"	
R24	QVZ3506-681	VR	
R25	QRD167J-471	CR	
R26	" -822	"	
R27	" -682	"	
R28	QVZ3506-222	VR	
R29	QRD167J-271	CR	
R30	" -681	"	
R31	" -333	"	
R32	" -822	"	
R33	" -471	"	
R34	QVZ3506-681	VR	
R35	QRD167J-223	CR	
R36	V44611-001	Bus Wire	
R37	" -001	"	
R38	QRD167J-223	CR	
R39	QRD141J-100	"	
R40	QRD167J-273	"	
R41	" -223	"	
R42	" -563	"	
R43	" -101	"	
R44	QVP4A0B-472	VR	
R45	QRD167J-103	CR	
R46	" -103	"	
R47	" -472	"	
R48	" -561	"	
R49	" -472	"	
R50	" -101	"	
R51	QVP4A0B-472	VR	
R52	QRD167J-103	CR	
R53	" -103	"	
R54	" -472	"	
R55	" -561	"	
R56	" -222	"	
R57	" -222	"	
R58	" -223	"	
R59	" -563	"	
R60	" -682	"	
R61	" -103	"	
R62	" -222	"	
R63	" -221	"	
R64	" -561	"	
R65	" -561	"	
R66	QRD143J-221	"	
R67	QRD167J-103	"	
R68	" -182	"	
R69	" -391	"	
R70	" -102	"	
R71	" -102	"	
R72	" -561	"	
R73	" -152	"	
R74	QRD181J-1R0	"	
R75	" -1R0	"	
R76	–	–	
R77	QRD167J-103	CR	
R78	" -223	"	
R79	" -223	"	
R80	–	–	
R81	QRD167J-273	CR	
R82	QVZ3506-681	VR	
R83	QRD167J-181	CR	

Symbol No.	Part No.	Part Name	Description
R84	QRD167J-822	CR	
R85	" -681	"	
R86	" -682	"	
R87	QVZ3506-222	VR	
R88	QRD167J-271	CR	
R89	" -333	"	
R90	" -822	"	
R91	" -181	"	
R92	QVZ3506-681	VR	
R93	QRD167J-223	CR	
R94	V44611-001	Bus Wire	
R95	" -001	"	
R96	QRD167J-223	CR	
R97	" -273	"	
R98	" -562	"	
R99	" -123	"	
R100	" -101	"	
R101	" -101	"	
R102	" -102	"	
R103	" -181	"	
R104	" -272	"	
R105	" -181	"	
R106	QVP4A0B-102	VR	
R107	QRD167J-222	CR	
R108	" -822	"	
R109	" -562	"	
R110	" -123	"	
R111	" -472	"	
R112	" -473	"	
R113	" -222	"	
R114	" -151	"	
R115	" -103	"	
R116	" -561	"	
R117	QVP4A0B-682	VR	
R118	QRD167J-472	CR	
R119	" -391	"	
R120	" -562	"	
R121	" -222	"	
R122	" -151	"	
R123	" -392	"	
R124	" -562	"	
R125	" -563	"	
★C 1	QEK41CM-476	E Cap	
★C 2	QFN41HK-333	MY Cap	
★C 3	QEE41CM-106	T Cap	
★C 4	QCS11HJ-120	C Cap	
★C 5	QFN41HK-473	MY Cap	
★C 6	" -473	"	
★C 7	QET41CM-107	E Cap	
★C 8	QCF11EZ-223	C Cap	
★C 9	" -223	"	
C10	QEK41HM-105	E Cap	
C11	" -105	"	
★C12	" -105	"	
C13	–	–	
C14	QAT3001-009	TR Cap	
C15	–	–	
C16	QAT3001-017	TR Cap	
C17	–	–	
C18	–	–	
C19	QAT3001-009	TR Cap	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
C20	QAT3001-017	TR Cap	
C21	QFN41HK-223	MY Cap	
C22	QCS11HJ-560	C Cap	
C23	QFN41HK-223	MY Cap	
C24	" -223	"	
C25	" -223	"	
C26	QCS11HJ-560	C Cap	
C27	QFN41HK-223	MY Cap	
C28	QEK41CM-476	E Cap	
C29	QCF11EZ-223	C Cap	
C30	QEK41HM-105	E Cap	
C31	QFN41HK-223	MY Cap	
C32	" -223	"	
C33	QEK41HM-105	E Cap	
C34	QCF11EZ-223	C Cap	
C35	QEK41CM-476	E Cap	
C36	QCF11EZ-223	C Cap	
C37	" -223	"	
C38	" -223	"	
C39	QEK41CM-476	E Cap	
C40	QCF11EZ-223	C Cap	
C41	QCS11HJ-390	"	
C42	QFN41HK-223	MY Cap	
C43	QEK41CM-476	E Cap	
C44	QCF11EZ-223	C Cap	
C45	QFN41HK-223	MY Cap	
C46	QCF11EZ-223	C Cap	
C47	QCS11HJ-390	"	
C48	QFN41HK-223	MY Cap	
C49	QEK41CM-476	E Cap	
C50	QCF11EZ-223	C Cap	
C51	QFN41HK-223	MY Cap	
C52	QEK41CM-476	E Cap	
C53	QCF11EZ-223	C Cap	
C54	QFN41HK-223	MY Cap	
C55	QCS11HJ-102	C Cap	
C56	" -330	"	
C57	QEK41CM-476	E Cap	
C58	QEK41HM-474	"	
C59	QCF11EZ-223	C Cap	
C60	" -223	"	
C61	QEK41CM-476	E Cap	
C62	QFN41HK-223	MY Cap	
C63	" -223	"	
C64	QCS11HJ-101	C Cap	
C65	" -101	"	
C66	QFN41HK-223	MY Cap	
C67	–	–	
C68	QAT3001-009	TR Cap	
C69	QCS11HJ-270	C Cap	
C70	QAT3001-017	TR Cap	
C71	–	–	
C72	QAT3001-009	TR Cap	
C73	QCS11HJ-270	C Cap	
C74	QAT3001-017	TR Cap	
C75	QFN41HK-223	MY Cap	
C76	QCS11HJ-560	C Cap	
C77	QFN41HK-223	MY Cap	
C78	" -223	"	
C79	" -223	"	
C80	QCS11HJ-560	C Cap	
C81	QFN41HK-223	MY Cap	
C82	QEK41CM-476	E Cap	

Symbol No.	Part No.	Part Name	Description
C83	QCF11EZ-223	C Cap	
C84	QEK41HM-105	E Cap	
C85	QFN41HK-223	MY Cap	
C86	" -223	"	
C87	QEK41HM-105	E Cap	
C88	QCF11EZ-223	C Cap	
C89	QEK41CM-476	E Cap	
C90	–	–	
C91	–	–	
C92	QFN41HK-562	MY Cap	
C93	QCF11EZ-223	C Cap	
C94	QEK41CM-476	E Cap	
C95	QFN41HK-223	MY Cap	
C96	QCF11EZ-223	C Cap	
C97	QEK41CM-476	E Cap	
C98	QFN41HK-223	MY Cap	
C99	QEK41CM-476	E Cap	
C100	QCF11EZ-223	C Cap	
C101	QFN41HK-332	MY Cap	
C102	" -223	"	
C103	" -223	"	
C104	QCF11EZ-223	C Cap	
C105	QEK41CM-476	E Cap	
C106	QFN41HK-223	MY Cap	
C107	" -223	"	
C108	QCF11EZ-223	C Cap	
C109	" -223	"	
⚠★L 1	PU48530-221K	Peaking Coil	
★L 2	" -470K	"	
★L 3	" -101K	"	
L 4	" -150K	"	
L 5	" -150K	"	
⚠L 6	" -221K	"	
⚠L 7	" -221K	"	
⚠L 8	" -221K	"	
⚠L 9	" -221K	"	
L10	PU30771-18	Coil	
L11	" -19	"	
⚠L12	PU48530-221K	Peaking Coil	
L13	" -150K	"	
L14	A04725-1000	"	
⚠L15	PU48530-221K	"	
L16	" -5R6K	"	
L17	" -5R6K	"	
L18	" -680	"	
L19	" -150K	"	
L20	" -150K	"	
⚠L21	" -221K	"	
L22	A04725-820	"	
⚠L23	PU48530-221	"	
⚠L24	" -221	"	
⚠L25	" -221	"	
⚠L26	" -221	"	
LPF 1	PU48517-4	L.P.F.	
EQ 1	PU48515	Equalizer	
DL 1	PU43627C	Delay Line	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
RY 1	PU46682	Relay	
RY 2	"	"	
★RY 3	"	"	
P131	PU43351-6	Cap. Housing	
P132	" -3	"	
P133	" -4	"	
P134	" -9R	"	
P135	" -6Y	"	
	PU50766	Test Pin	TP1—TP16
★B 1	V44611-001	Bus Wire	
★B 2	QWY122-020	"	
★B 3	V44611-002	"	
★B 4	" -002	"	
★B 5	" -002	"	
B 6	QWY122-020	"	
B 7	V44611-002	"	
B 8	" -002	"	
B 9	" -001	"	
B10	QWY122-020	"	
B11	V44611-001	"	
B12	" -001	"	
B13	" -002	"	
B14	" -002	"	
B15	" -002	"	
B16	" -002	"	
B17	" -001	"	
B18	" -002	"	
B19	" -002	"	
B20	" -002	"	
B21	QWY122-020	"	
B22	V44611-001	"	
B23	" -001	"	
B24	" -001	"	
B25	" -001	"	
B26	" -001	"	
B27	QWY122-020	"	
B28	V44611-002	"	
B29	" -002	"	
B30	" -001	"	
B31	" -001	"	
B32	" -001	"	
B33	" -002	"	
B34	" -002	"	
	PU53647	Shield Case (1)	
	PU53648	" (2)	
	PU53649	" (3)	
	PU21415	CENTER STAY	
	GBST3006Z	TH. TAP SCREW	3
C110	QCF11EZ-223	C Cap	
C111	" -223	"	
C112	" -223	"	
C113	" -223	"	
C114	" -223	"	

★ symbol : Not used in BP-5300TR

8.5.4 Head Circuit Board Ass'y $\boxed{1}\boxed{5}$

. . . . PU50643A-1

Symbol No.	Part No.	Part Name	Description
	PU53843	Head Printed Board	
P151	PU43351-103	Cap Housing	
P152	" -103R	"	
P153	" -103	"	
P154	" -103Y	"	

8.5.5 SECAM Color Amp. Circuit Board Ass'y 1 6
BR-6400TR . . . . ⚠ PU21429A
BP-5300TR . . . . ⚠ PU21429B

Symbol No.	Part No.	Part Name	Description
★IC 1	BA401	Integrated Circuit	
★IC 2	M53274P	″	
★IC 3	TA7347P	″	
IC 4	UPD4528C	″	
IC 5	″	″	
IC 6	TA7347P	″	
IC 7	BA7007	″	
IC 8	UPC1004C	″	
IC 9	SN76515	″	
IC10	TA7347P	″	
★Q 1	2SC2647C	Transistor	
★Q 2	″	″	
★Q 3	″	″	
★Q 4	″	″	
Q 5	″	″	
Q 6	″	″	
Q 7	″	″	
★Q 8	″	″	
Q 9	″	″	
Q10	2SB641Q	″	
Q11	2SC2647C	″	
Q12	″	″	
Q13	″	″	
Q14	″	″	
Q15	″	″	
Q16	″	″	
★D 1	1SS93	Diode	
★D 2	″	″	
★D 3	1SS133	″	
★D 4	RD5.1EB3	Zener Diode	
D 5	1SS133	Diode	
D 6	″	″	
D 7	″	″	
D 8	″	″	
D 9	″	″	
★R 1	QRD167J-103	CR	
★R 2	″ -103	″	
★R 3	″ -472	″	
★R 4	″ -102	″	
★R 5	″ -181	″	
★R 6	″ -272	″	
★R 7	″ -181	″	
⚠ ★R 8	QRG129J-221	FR	
★R 9	QRD167J-183	CR	
★R10	″ -823	″	
★R11	″ -221	″	
★R12	″ -182	″	
★R13	QVP4A0B-223	VR	
★R14	QRD167J-223	CR	
★R15	″ -123	″	
★R16	″ -182	″	
★R17	QVP4A0B-102	VR	
★R18	QRD167J-102	CR	
R19	–	–	
★R20	QRD167J-102	CR	
⚠ ★R21	QRG019J-181S	FR	
★R22	QRD167J-182	CR	
⚠ ★R23	QRG129J-221	FR	
★R24	QRD167J-102	CR	
★R25	″ -223	″	
★R26	″ -563	″	
R27	″ -102	″	
R28	″ -223	″	
R29	″ -223	″	
R30	″ -223	″	
R31	″ -102	″	
R32	QVP4A0B-103	VR	
R33	QRD167J-472	CR	
R34	″ -103	″	
R35	″ -102	″	
R36	QVP4A0B-223	VR	
R37	QRD167J-223	CR	
R38	″ -223	″	
R39	″ -223	″	
R40	″ -103	″	
R41	QVP4A0B-473	VR	
R42	QRD167J-472	CR	
R43	″ -103	″	
R44	″ -273	″	
R45	QVP4A0B-104	VR	
R46	QRD167J-103	CR	
R47	″ -103	″	
R48	″ -472	″	
R49	″ -332	″	
★R50	″ -332	″	
R51	″ -100	″	
R52	″ -563	″	
R53	″ -683	″	
R54	″ -332	″	
R55	″ -102	″	
★R56	″ -223	″	
R57	″ -563	″	
R58	–	–	
R59	QRD167J-332	CR	
R60	″ -102	″	
R61	″ -103	″	
R62	″ -102	″	
R63	″ -222	″	
R64	″ -154	″	
R65	″ -183	″	
R66	″ -223	″	
R67	″ -102	″	
R68	″ -104	″	
R69	″ -391	″	
R70	″ -103	″	
R71	″ -102	″	
R72	″ -102	″	
R73	″ -102	″	
⚠ R74	QRG019J-181S	FR	
R75	QVP4A0B-333	VR	
R76	QRD167J-472	CR	
R77	″ -472	″	
R78	QVP4A0B-333	VR	
R79	QRD167J-104	CR	
R80	″ -102	″	
R81	″ -104	″	
R82	″ -122	″	
R83	″ -102	″	
R84	″ -102	″	

★symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
R85	QRD167J-332	CR	
R86	" -102	"	
R87	" -100	"	
⚠ R88	QRG019J-181S	FR	
R89	QRD167J-332	CR	
R90	" -472	"	
R91	QVP4A0B-333	VR	
R92	QRD167J-273	CR	
R93	" -102	"	
R94	" -102	"	
R95	" -332	"	
R96	" -102	"	
R97	" -102	"	
R98	" -181	"	
R99	" -272	"	
R100	" -181	"	
R101	" -102	"	
⚠ R102	QRG129J-221	FR	
R103	QVP4A0B-472	VR	
R104	QRD167J-102	CR	
R105	" -223	"	
R106	" -563	"	
★C 1	QFN41HK-103	MY Cap	
★C 2	" -103	"	
★C 3	QCF11EZ-223	C Cap	
★C 4	QEK41CM-476	E Cap	
★C 5	QFN41HK-102	MY Cap	
★C 6	QEK41CM-476	E Cap	
★C 7	QCF11EZ-223	C Cap	
★C 8	QFN41HK-102	MY Cap	
★C 9	" -102	"	
★C10	QCF11EZ-223	C Cap	
★C11	QEK41CM-476	E Cap	
★C12	QFN41HK-102	MY Cap	
★C13	QCF11EZ-102	C Cap	
★C14	–	–	
★C15	QCS11HJ-121	C Cap	
★C16	–	–	
★C17	QCF11EZ-223	C Cap	
★C18	QEK41CM-476	E Cap	
★C19	QFN41HK-103	MY Cap	
★C20	" -103	"	
★C21	QEK41CM-476	E Cap	
★C22	QCF11EZ-223	C Cap	
★C23	QFN41HK-103	MY Cap	
★C24	–	–	
★C25	QCF11EZ-223	C Cap	
★C26	QEK41CM-476	E Cap	
★C27	QCF11EZ-223	C Cap	
★C28	QFN41HK-223	MY Cap	
C29	" -102	"	
C30	QEK41CM-476	E Cap	
C31	QCF11EZ-223	C Cap	
C32	QFN41HK-102	MY Cap	
C33	" -682	"	
C34	QEK41CM-476	E Cap	
C35	QCF11EZ-223	C Cap	
C36	QFN41HK-122	MY Cap	
C37	QCF11EZ-223	C Cap	
C38	QCS11HJ-560	"	
C39	QCF11EZ-223	"	

Symbol No.	Part No.	Part Name	Description
C40	QEK41CM-476	E Cap	
C41	QCS11HJ-101	C Cap	
C42	" -471	"	
C43	QCF11EZ-223	"	
C44	QEK41CM-476	E Cap	
C45	QCF11EZ-223	C Cap	
C46	QFN41HK-103	MY Cap	
★C47	" -102	"	
C48	" -103	"	
C49	QET41CM-107	E Cap	
C50	QEK41CM-106	"	
C51	" -336	"	
C52	QCF11EZ-223	C Cap	
C53	QEK41CM-476	E Cap	
C54	QFN41HK-333	MY Cap	
C55	" -223	"	
C56	QEK41CM-476	E Cap	
C57	QCF11EZ-223	C Cap	
C58	QCT05LH-391	"	
C59	QEK41CM-476	E Cap	
C60	QCF11EZ-223	C Cap	
C61	QFN41HK-333	MY Cap	
C62	QCF11EZ-223	C Cap	
C63	" -223	"	
C64	" -223	"	
C65	QEK41CM-476	E Cap	
C66	QFN41HK-103	MY Cap	
C67	QCF11EZ-223	C Cap	
C68	QFN41HK-103	MY Cap	
C69	" -103	"	
C70	QCF11EZ-223	C Cap	
C71	QEK41CM-476	E Cap	
C72	QFN41HK-103	MY Cap	
C73	QEK41CM-476	E Cap	
C74	QCF11EZ-223	C Cap	
C75	" -223	"	
C76	QEK41CM-476	E Cap	
C77	–	–	
C78	QFN41HK-104	MY Cap	
C79	" -102	"	
C80	" -102	"	
C81	" -102	"	
C82	" -102	"	
C83	QEK41CM-476	E Cap	
C84	QCF11EZ-223	C Cap	
C85	QFN41HK-102	MY Cap	
C86	" -103	"	
C87	QCF11EZ-223	C Cap	
C88	–	–	
C89	QCF11EZ-223	C Cap	
C90	QEK41CM-476	E Cap	
C91	QCF11EZ-223	C Cap	
⚠★L 1	PU48530-221K	Peaking Coil	
⚠★L 2	" -221K	"	
⚠★L 3	" -221K	"	
⚠★L 4	" -221K	"	
⚠★L 5	" -221K	"	
⚠L 6	" -221K	"	
⚠L 7	" -221K	"	
⚠L 8	" -221K	"	
L 9	PU30771-7	Coil	
⚠L10	PU48530-221K	Peaking Coil	

★symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
⚠ L11	PU48530-221K	Peaking Coil	
L12	PU46399-2	Coil	
⚠ L13	PU48530-221K	Peaking Coil	
⚠ L14	" -221K	"	
⚠ L15	" -221K	"	
⚠ L16	" -221K	"	
⚠ L17	" -221K	"	
⚠ L18	" -221K	"	
★BPF 1	PU49404	B.P.F.	
★BPF 2	PU49406	"	
BPF 3	PU49408	"	
BPF 4	PU49404	"	
HPF 1	PU49438	H.P.F.	
★EQ 1	PU49405	Equalizer	
EQ 2	PU49407	"	
EQ 3	PU49409	"	
★BB 1	PU49411	Bell Block	
★BB 2	PU49412	"	
★BB 3	PU49414-2	"	
LC 1	PU49057	LC Block	
CF 1	PU46521	Ceramic Filter	
P161	PU43351-4R	Cap. Housing	
P162	" -4Y	"	
P163	" -4	"	
P164	" -8	"	
P165	" -2	"	
	PU45908-2	Test Pin	
	PU33643	Shield Case	
	GBST3006Z	TH. Tap. Screw	
	PU53811	Hook (B)	
	GBST3006Z	TH. Tap. Screw	
	PU32908	Servo P.W.B. Stay	
	GBST3006Z	TH. Tap. Screw	

★ symbol : Not used in BP-5300TR

8.5.6 Reel Servo Circuit Board Ass'y [2][0]

. . . . ⚠ PU50644A-2

Symbol No.	Part No.	Part Name	Description
IC 1	UPC324C	Integrated Circuit	
IC 2	TC4066BP	"	
IC 3	TC4071BP	"	
IC 4	TC4069UBP	"	
IC 5	TA7140P	"	
IC 6	HA17555PS	"	
IC 7	M51207L	"	
IC 8	UPC324C	"	
IC 9	TC4066BP	"	
IC10	LM2907N-8	"	
IC11	UPC324C	"	
IC12	M51207L	"	
IC13	LM2907N-8	"	
IC14	TC4066BP	"	
IC15	HA17555PS	"	
Q 1	2SD636R,S	Transistor	
Q 2	"	"	
Q 3	"	"	
Q 4	–	–	
Q 5	2SD636R,S	Transistor	
Q 6	2SB641R,S	"	
Q 7	2SD636R,S	"	
Q 8	–	–	
Q 9	2SD636R, S	Transistor	
⚠Q10	2SB751Q	"	
Q11	2SD636R,S	"	
Q12	"	"	
Q13	"	"	
Q14	"	"	
⚠Q15	2SB751Q	"	
Q16	2SD636R,S	"	
Q17	–	–	
Q18	2SD636R,S	Transistor	
Q19	"	"	
Q20	2SB641R,S	"	
Q21	2SD636R,S	"	
Q22	2SD837Q	"	
Q23	"	"	
Q24	2SD636R,S	"	
Q25	"	"	
Q26	2SB641R,S	"	
Q27	2SD636R,S	"	
Q28	"	"	
Q29	2SD636R,S	"	
D 1	1SS133	Diode	
D 2	"	"	
D 3	"	"	
D 4	U05E	"	
D 5	1SS133	"	
D 6	U05E	"	
D 7	1SS133	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
RA 1	EXB-P85224M	Resistor Array	
RA 2	"	"	

Symbol No.	Part No.	Part Name	Description
R 1	QVP4AOB-102	VR	1 K
R 2	QRD167J-561	CR	560 1/6 W, J
R 3	″ -103	″	10 K ″ ″
R 4	″ -103	″	10 K ″ ″
R 5	″ -333	″	33 K ″ ″
R 6	″ -103	″	10 K ″ ″
R 7	″ -124	″	120 K ″ ″
R 8	″ -472	″	4.7 K ″ ″
R 9	″ -682	″	6.8 K ″ ″
R10	″ -222	″	2.2 K ″ ″
R11	″ -104	″	100 K ″ ″
R12	QRV143F-5361	CMF R	5.36 K 1/4 W, F
R13	QRD167J-124	CR	120 K 1/6 W, J
R14	QRV143F-4641	CMF R	4.64 K 1/4 W, F
R15	QRD167J-105	CR	1 M 1/6 W, J
R16	″ -103	″	10 K ″ ″
R17	″ -224	″	220 K ″ ″
R18	″ -103	″	10 K ″ ″
R19	QRV143F-5361	CMF R	5.36 K 1/4 W, F
R20	″ -5361	″	5.36 K ″ ″
R21	QRD167J-103	CR	10 K 1/6 W, J
R22	″ -103	″	10 K ″ ″
R23	–	–	
R24	–	–	
R25	–	–	
R26	QRD167J-104	CR	100 K 1/6 W, J
R27	″ -224	″	220 K ″ ″
R28	″ -472	″	4.7 K ″ ″
R29	QVP4AOB-102	VR	1 K
R30	QRD167J-682	CR	6.8 K 1/6 W, J
R31	″ -472	″	4.7 K ″ ″
R32	QVP4AOB-102	VR	1 K
R33	QRD167J-472	CR	4.7 K 1/6 W, J
R34	QRD187J-103	″	10 K 1/8 W, J
R35	QRD167J-103	″	10 K 1/6 W, J
R36	″ -473	″	47 K ″ ″
R37	″ -104	″	100 K ″ ″
R38	″ -224	″	220 K ″ ″
R39	″ -103	″	10 K ″ ″
R40	″ -103	″	10 K ″ ″
R41	″ -103	″	10 K ″ ″
R42	″ -102	″	1 K ″ ″
R43	″ -331	″	330 ″ ″
R44	″ -471	″	470 ″ ″
R45	QVP4AOB-221	VR	220
R46	QRD167J-561	CR	560 1/6 W, J
R47	″ -563	″	56 K ″ ″
R48	″ -103	″	10 K ″ ″
R49	″ -223	″	22 K ″ ″
R50	–	–	
R51	QRD167J-224	CR	220 K 1/6 W, J
R52	″ -473	″	47 K ″ ″
R53	″ -392	″	3.9 K ″ ″
R54	″ -223	″	22 K ″ ″
R55	″ -103	″	10 K ″ ″
R56	″ -103	″	10 K ″ ″
R57	″ -394	″	390 K ″ ″
R58	″ -105	″	1 M ″ ″
R59	″ -103	″	10 K ″ ″
R60	″ -103	″	10 K ″ ″
R61	″ -224	″	220 K ″ ″
R62	″ -103	″	10 K ″ ″
R63	″ -103	″	10 K ″ ″
R64	QRD167J-822	CR	8.2 K 1/6 W, J
R65	″ -682	″	6.8 K ″ ″
R66	″ -223	″	22 K ″ ″
R67	QRD187J-223	″	22 K 1/8 W, J
R68	QRD167J-104	″	100 K 1/6 W, J
R69	″ -473	″	47 K ″ ″
R70	″ -104	″	100 K ″ ″
R71	″ -103	″	10 K ″ ″
R72	QVP4AOB-102	VR	1 K
R73	QRD167J-122	CR	1.2 K 1/6 W, J
R74	″ -103	″	10 K ″ ″
R75	″ -104	″	100 K ″ ″
R76	″ -103	″	10 K ″ ″
R77	″ -103	″	10 K ″ ″
R78	″ -104	″	100 K ″ ″
R79	QRV143F-5623	CMF R	562 K 1/4 W, F
R80	QRD167J-103	CR	10 K 1/6 W, J
R81	″ -224	″	220 K ″ ″
R82	″ -104	″	100 K ″ ″
R83	″ -103	″	10 K ″ ″
R84	″ -332	″	3.3 K ″ ″
R85	″ -681	″	680 ″ ″
R86	″ -392	″	3.9 K ″ ″
R87	″ -333	″	33 K ″ ″
R88	″ -473	″	47 K ″ ″
R89	″ -104	″	100 K ″ ″
R90	″ -562	″	5.6 K ″ ″
R91	″ -103	″	10 K ″ ″
R92	″ -223	″	22 K ″ ″
R93	″ -103	″	10 K ″ ″
R94	″ -103	″	10 K ″ ″
R95	″ -394	″	390 K ″ ″
R96	″ -105	″	1 M ″ ″
R97	QRD187J-103	″	10 K 1/8 W, J
R98	QRD167J-103	″	10 K 1/6 W, J
R99	″ -103	″	10 K ″ ″
R100	″ -103	″	10 K ″ ″
R101	″ -822	″	8.2 K ″ ″
R102	″ -682	″	6.8 K ″ ″
R103	″ -223	″	22 K ″ ″
R104	″ -223	″	22 K ″ ″
R105	″ -104	″	100 K ″ ″
R106	″ -473	″	47 K ″ ″
R107	″ -104	″	100 K ″ ″
R108	″ -103	″	10 K ″ ″
R109	QVP4AOB-102	VR	1 K
R110	QRD167J-122	CR	1.2 K 1/6 W, J
R111	″ -103	″	10 K ″ ″
R112	″ -104	″	100 K ″ ″
R113	″ -103	″	10 K ″ ″
R114	″ -103	″	10 K ″ ″
R115	″ -104	″	100 K ″ ″
R116	QRV143F-5623	CMF R	562 K 1/4 W, F
R117	QRD167J-103	CR	10 K 1/6 W, J
R118	″ -224	″	220 K ″ ″
R119	″ -104	″	100 K ″ ″
R120	″ -103	″	10 K ″ ″
R121	″ -332	″	3.3 K ″ ″
R122	″ -681	″	680 ″ ″
R123	″ -392	″	3.9 K ″ ″
R124	″ -333	″	33 K ″ ″
R125	″ -473	″	47 K ″ ″
R126	″ -104	″	100 K ″ ″

Symbol No.	Part No.	Part Name	Description
R127	QRD167J-562	CR	5.6 K 1/6 W, J
R128	QVP4AOB-224	VR	220 K
R129	QRD167J-105	CR	1 M 1/6 W, J
R130	" -104	"	100 K " "
R131	" -104	"	100 K " "
R132	" -103	"	10 K " "
R133	" -104	"	100 K " "
R134	" -105	"	1 M " "
R135	QRD187J-103	"	10 K 1/8 W, J
R136	QRD167J-103	"	10 K 1/6 W, J
R137	" -103	"	10 K " "
R138	" -472	"	4.7 K " "
R139	QVP4AOB-102	VR	1 K
R140	QRD167J-682	CR	6.8 K 1/6 W, J
R141	QRD187J-472	"	4.7 K 1/8 W, J
R142	QVP4AOB-102	VR	1 K
R143	QRD167J-472	CR	4.7 K 1/6 W, J
R144	" -472	"	4.7 K " "
R145	QVP4AOB-102	VR	1 K
R146	QRD167J-562	CR	5.6 K 1/6 W, J
R147	" -473	"	47 K " "
R148	" -333	"	33 K " "
R149	QRD121J-101	"	100 1/2 W, J
R150	QRX019J-R47S	MFR	0.47 1 W, J
R151	QRD167J-473	CR	47 K 1/6 W, J
R152	" -333	"	33 K " "
R153	QRD121J-101	"	100 1/2 W, J
R154	QRX019J-R47S	MFR	0.47 1 W, J
R155	QRD167J-223	CR	22 K 1/6 W, J
R156	—	—	
R157	—	—	
R158	QRD121J-681	CR	680 1/2 W, J
R159	" -681	"	680 " "
R160	" -681	"	680 " "
R161	QRD167J-224	"	220 K 1/6 W, J
R162	" -224	"	220 K " "
R163	" -394	"	390 K " "
R164	" -105	"	1 M " "
R165	" -104	"	100 K " "
R166	" -102	"	1 K " "
R167	QVP4AOB-102	VR	1 K
R168	QRD167J-103	CR	10 K 1/6 W, J
R169	" -562	"	5.6 K " "
R170	QVP4AOB-102	VR	1 K
R171	QRD167J-472	CR	4.7 K 1/6 W, J
R172	" -563	"	56 K " "
R173	" -104	"	100 K " "
R174	" -104	"	100 K " "
R175	" -224	"	220 K " "
R176	" -224	"	220 K " "
R177	" -823	"	82 K " "
R178	" -224	"	220 K " "
R179	" -103	"	10 K " "
C 1	QET41CR-107	E Cap	100 16 V
C 2	QCF11HP-103	C Cap	0.01 50 V
C 3	QET41HR-105	E Cap	1 "
C 4	QET41CR-106	"	10 16 V
C 5	QFN41HK-124	MY Cap	0.12 50 V
C 6	QET41CR-106	E Cap	10 16 V
C 7	QFN41HK-123	MY Cap	0.012 50 V
C 8	—	—	
C 9	QFN41HK-153	MY Cap	0.015 50 V
C10	QET41CR-227	E Cap	220 16 V
C11	" -227	"	220 "
C12	" -106	"	10 "

Symbol No.	Part No.	Part Name	Description
C13	QET41CR-106	E Cap	10 16 V
C14	" -106	"	10 "
C15	QFN41HK-473	MY Cap	0.047 50 V
C16	QET41CR-106	E Cap	10 16 V
C17	QFN41HK-103	MY Cap	0.01 50 V
C18	" -103	"	0.01 "
C19	QET41CR-476	E Cap	47 16 V
C20	QCF11HP-103	C Cap	0.01 50 V
C21	QET41CR-106	E Cap	10 16 V
C22	" -106	"	10 "
C23	QFN41HK-223	MY Cap	0.022 50 V
C24	QET41CR-106	E Cap	10 16 V
C25	" -476	"	47 "
C26	—	—	
C27	QFN41HK-563	MY Cap	0.056 50 V
C28	" -223	"	0.022 "
C29	QET41CR-106	E Cap	10 16 V
C30	QCF11HP-103	C Cap	0.01 50 V
C31	QET41CR-107	E Cap	100 16 V
C32	QFN41HK-103	MY Cap	0.01 50 V
C33	" -122	"	0.0012
C34	" -273	"	0.027 "
C35	QCF11HP-103	C Cap	0.01 "
C36	QET41ER-107	E Cap	100 25 V
C37	QCS11HJ-5R0	C Cap	5 P 50 V
C38	QET41ER-107	E Cap	100 25 V
C39	—	—	
C40	QET41ER-477	E Cap	470 25 V
C41	QCF11HP-223	C Cap	0.022 50 V
C42	QET41CR-106	E Cap	10 16 V
C43	" -106	"	10 "
C44	" -107	"	100 "
C45	QET41HR-105	"	1 50 V
C46	QFN41HK-182	MY Cap	0.0018 "
C47	" -332	"	0.0033 "
C48	" -104	"	0.1 "
C49	QET41CR-106	E Cap	10 16 V
C50	QFN41HK-102	MY Cap	0.001 50 V
C51	" -273	"	0.027 "
C52	QCF11HP-103	C Cap	0.01 "
C53	QET41ER-107	E Cap	100 25 V
C54	—	—	
C55	QET41ER-107	E Cap	100 25 V
C56	QCF11HP-223	C Cap	0.022 50 V
C57	QET41ER-477	E Cap	470 25 V
C58	QCF11HP-223	C Cap	0.022 50 V
C59	QET41CR-106	E Cap	10 16 V
C60	—	—	
C61	QET41CR-107	E Cap	100 16 V
C62	QET41HR-105	"	1 50 V
C63	QFN41HK-182	MY Cap	0.0018 "
C64	" -332	"	0.0033 "
C65	" -104	"	0.1 "
C66	QET41CR-106	E Cap	10 16 V
C67	QFN41HK-102	MY Cap	0.001 50 V
C68	QET41ER-476	E Cap	47 25 V
C69	QET41HR-105	"	1 50 V
C70	QFN41HK-103	MY Cap	0.01 "
C71	QCF11HP-103	C Cap	0.01 "
C72	QET41CR-107	E Cap	100 16 V
C73	QFN41HK-103	MY Cap	0.01 50 V
C74	QET41HR-105	E Cap	1 "
C75	QET41CR-107	"	100 16 V

Symbol No.	Part No.	Part Name	Description
C76	QCF11HP-103	C Cap	0.01 50 V
C77	QET41CR-106	E Cap	10 16 V
C78	" -106	"	10 "
C79	" -106	"	10 "
C80	" -227	"	220 "
C81	QCF11HP-223	C Cap	0.022 50 V
C82	QET41ER-227	E Cap	220 25 V
C83	QCF11HP-223	C Cap	0.022 50 V
C84	QET41ER-106	E Cap	10 25 V
C85	" -106	"	10 "
C86	QFN41HK-103	MY Cap	0.01 50 V
C87	" -333	"	0.033 16 V
C88	QET41CR-107	E Cap	100 "
C89	" -106	"	10 "
C90	QFN41HK-103	MY Cap	0.01 50 V
C91	" -103	"	0.01 "
C92	" -102	"	0.001 "
C93	" -102	"	0.001 "
⚠L 1	A04725-270	Peaking Coil	
⚠L 2	" -270	"	
L 3	PU44041-104	Choke Coil	
⚠L 4	A04725-270	Peaking Coil	
⚠L 5	" -270	"	
⚠L 6	PU50755	Choke Coil	
⚠L 7	A04725-270	Peaking Coil	
⚠L 8	" -270	"	
⚠L 9	PU50755	Choke Coil	
⚠L10	A04725-270	Peaking Coil	
⚠L11	" -270	"	
⚠L12	" -270	"	
⚠L13	" -270	"	
⚠L14	" -270	"	
⚠L15	PU50277	Inductor	
J201	PU50715-6	Female Connector	
J202	" -18	"	
J203	" -16	"	
	PU45908	Test Pin	TP1—TP18
	PU33644	Servo Heat Sink (1)	for Q10
	PU50718	" (2)	for Q15
	PU45375-1	TR. Spacer	for Q10, Q15
	PU41624-6	Isolation Washer	"
	DPSP3008ZS	Screw	
	GBST3008ZS	"	
	PU33642	Shield Case	
	PU32908	Servo P.W.B. Stay	
	GBST3008ZS	Screw	

8.5.7 Capstan Servo Circuit Board Ass'y 2 1
. . . . ⚠ PU21430A

Symbol No.	Part No.	Part Name	Description
IC 1	UPC1458C	Integrated Circuit	
IC 2	LM2907N-8	"	
IC 3	UPC1458C	"	
IC 4	UPC358C	"	
⚠ IC 5	TA78L010AP	"	
IC 6	AN360	"	
IC 7	LM2907N-8	"	
IC 8	TC4030BP	"	
IC 9	TC4011BP	"	
IC10	"	"	
IC11	TC4027BP	"	
IC12	HA17555PS	"	
IC13	TC4555BP	"	
IC14	TC4017BP	"	
IC15	HA17555PS	"	
IC16	LM2907N-8	"	
IC17	UPC358C	"	
IC18	AN6341N	"	
IC19	TC4066BP	"	
IC20	UPC358C	"	
IC21	TC4011BP	"	
IC22	"	"	
IC23	"	"	
IC24	TC4066BP	"	
IC25	"	"	
IC26	"	"	
Q 1	2SD636R,S	Transistor	
Q 2	"	"	
Q 3	"	"	
Q 4	2SB641R,S	"	
Q 5	2SD636R,S	"	
Q 6	"	"	
Q 7	"	"	
Q 8	2SK30AO	"	
Q 9	2SB641R,S	"	
Q10	2SC732BL	"	
Q11	2SD636R,S	"	
Q12	"	"	
Q13	"	"	
Q14	2SB641R,S	"	
Q15	2SD636R,S	"	
Q16	"	"	
Q17	"	"	
Q18	2SD639R,S	"	
Q19	2SC1983R	"	
Q20	2SB751Q	"	
Q21	2SC1983R	"	
Q22	2SD639R,S	"	
Q23	"	"	
Q24	2SC1983R	"	
Q25	2SB751Q	"	
Q26	2SC1983R	"	
Q27	2SD639R,S	"	
Q28	2SD636R,S	"	
Q29	"	"	
D 1	1SS133	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	

Symbol No.	Part No.	Part Name	Description
D 5	1SS133	Diode	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	"	"	
D12	RD4.7EB2	Zener Diode	
R 1	QRD167J-101	CR	
R 2	" -103	"	
R 3	QVP4A0B-103	VR	
R 4	QRD167J-103	CR	
R 5	" -563	"	
R 6	" -153	"	
R 7	" -153	"	
R 8	" -333	"	
R 9	" -472	"	
R10	" -472	"	
R11	" -221	"	
R12	" -473	"	
R13	" -103	"	
R14	QRV143F-1403	CMF R	140 K
R15	QRD167J-472	CR	
R16	QRV143F-1003	CMF R	100 K
R17	" -2611	"	2.61 K
R18	QVP4A0B-102	VR	
R19	QRV143F-3921	CMF R	3.92 K
R20	" -1912	"	19.1 K
R21	QRD167J-332	CR	
R22	QVP4A0B-102	VR	
R23	QRD167J-332	CR	
R24	QRV143F-1002	CMF R	10 K
R25	" -1182	"	11.8 K
R26	QRD167J-103	CR	
R27	" -103	"	
R28	" -103	"	
R29	" -104	"	
R30	" -224	"	
R31	" -154	"	
R32	" -153	"	
R33	" -221	"	
R34	" -102	"	
R35	" -104	"	
R36	" -104	"	
R37	" -105	"	
R38	" -104	"	
R39	" -472	"	
R40	QVP4A0B-222	VR	
R41	QRD167J-562	CR	
R42	" -152	"	
R43	V44611-001	"	
R44	" -103	"	
R45	" -473	"	
R46	" -393	"	
R47	" -564	"	
R48	" -121	"	
R49	" -272	"	
R50	" -392	"	
R51	" -103	"	
R52	QRV143F-5623	CMF R	562 K
R53	" -1183	"	118 K

Symbol No.	Part No.	Part Name	Description
R54	QRD167J-103	CR	12.1 K
R55	QRV143F-1212	CMF R	
R56	QRD167J-333	CR	6.81 K
R57	QRD143F-6811	CMF R	
R58	QRD167J-393	CR	
R59	" -102	"	
R60	" -332	"	
R61	" -103	"	
R62	QVP4A0B-222	VR	
R63	QRD167J-332	CR	
R64	" -223	"	
R65	" -104	"	
R66	" -104	"	
R67	" -473	"	
R68	" -104	"	
R69	" -103	"	
R70	" -104	"	
R71	" -103	"	
R72	" -473	"	
R73	" -104	"	
R74	" -223	"	
R75	" -333	"	
R76	" -472	"	
R77	" -472	"	
R78	" -224	"	
R79	–	–	
R80	QRD167J-332	CR	
R81	" -473	"	
R82	" -333	"	
R83	" -182	"	
R84	" -473	"	
R85	" -564	"	
R86	" -472	"	
R87	" -103	"	
R88	" -223	"	
R89	" -104	"	
R90	QVP4A0B-224	VR	
R91	QRD167J-334	CR	
R92	" -104	"	
R93	" -472	"	
R94	" -103	"	
R95	QRV143F-5233	CMF R	523 K
R96	QRD167J-103	CR	
R97	QRV143F-1153	CMF R	115 K
R98	" -1153	"	115 K
R99	" -5762	"	57.6 K
R100	QRD167J-104	CR	
R101	" -103	"	
R102	" -103	"	
R103	" -104	"	
R104	" -123	"	
R105	" -472	"	
R106	QVP4A0B-102	VR	
R107	QRD167J-472	CR	
R108	" -104	"	
R109	" -223	"	
R110	" -104	"	
R111	" -473	"	
R112	QVZ3501-224	VR	
R113	QRD167J-184	CR	
R114	" -683	"	
R115	" -104	"	
R116	QRE167J-103	"	

Symbol No.	Part No.	Part Name	Description
R117	QRE167J-102	CR	
R118	QRV143F-1502	CMF R	15 K
R119	QRD167J-102	CR	
R120	〃 -474	〃	
R121	〃 -154	〃	
R122	QRV143F-1272	CMF R	12.7 K
R123	〃 -1002	〃	10 K
R124	QRD167J-105	CR	
R125	〃 -224	〃	
R126	QRV143F-5621	CMF R	5.62 K
R127	〃 -6041	〃	6.04 K
R128	QRD167J-222	CR	
R129	〃 -104	〃	
R130	QRV143F-6811	CMF R	6.81 K
R131	〃 -3481	〃	3.48 K
R132	–	–	
R133	QRD167J-104	CR	
R134	〃 -332	〃	
R135	〃 -103	〃	
R136	〃 -273	〃	
R137	〃 -223	〃	
R138	〃 -223	〃	
R139	〃 -104	〃	
R140	〃 -103	〃	
R141	〃 -103	〃	
R142	〃 -103	〃	
R143	〃 -105	〃	
R144	〃 -563	〃	
R145	〃 -473	〃	
R146	〃 -104	〃	
⚠R147	QRZ0054-150	FR	
R148	QRD167J-222	CR	
R149	〃 -333	〃	
R150	〃 -333	〃	
R151	〃 -102	〃	
R152	〃 -472	〃	
R153	〃 -333	〃	
R154	〃 -473	〃	
R155	〃 -103	〃	
R156	〃 -222	〃	
R157	〃 -333	〃	
R158	〃 -333	〃	
R159	〃 -102	〃	
R160	〃 -472	〃	
R161	〃 -333	〃	
R162	〃 -473	〃	
R163	〃 -103	〃	
R164	〃 -103	〃	
R165	〃 -224	〃	
R166	〃 -822	〃	
R167	〃 -103	〃	
R168	〃 -103	〃	
R169	〃 -682	〃	
R170	〃 -332	〃	
R171	QVP4A0B-224	VR	
R172	QRD167J-184	CR	
R173	〃 -224	〃	
R174	QRV143F-4993	CMF R	499 K
R175	〃 -2213	〃	221 K
R176	〃 -1653	〃	165 K
R177	〃 -1653	〃	165 K
R178	〃 -8252	〃	82.5 K
R179	–	–	

Symbol No.	Part No.	Part Name	Description
R180	QRV143F-3011	CMF R	3.01 K
R181	〃 -1213	〃	121 K
R182	QRD167J-103	CR	
R183	〃 -103	〃	
R184	〃 -104	〃	
R185	〃 -473	〃	
R186	〃 -332	〃	
R187	〃 -104	〃	
R188	〃 -332	〃	
R189	〃 -473	〃	
R190	〃 -222	〃	
RA 1	EXB-P85224M	Resistor Array	
RA 2	〃	〃	
C 1	QET41CM-107	E Cap	
C 2	〃 -227	〃	
C 3	QEE41CM-226	T Cap	
C 4	QET41CM-106	E Cap	
C 5	QEE41CM-226	T Cap	
C 6	QFP42AF-102M	PP Cap	
C 7	QFN41HK-104	MY Cap	
C 8	QET41CM-106	E Cap	
C 9	QFN41HK-472	MY Cap	
C10	QET41CM-106	E Cap	
C11	–	–	
C12	QEE41CM-106	T Cap	
C13	QFN41HK-104	MY Cap	
C14	〃 -103	〃	
C15	QET41CM-106	E Cap	
C16	〃 -107	〃	
C17	QCF11HP-103	C Cap	
C18	QCS11HK-330	〃	
C19	QET41CM-476	E Cap	
C20	QCF11HP-103	C Cap	
C21	QEE41CM-106	T Cap	
C22	–	–	
C23	QET41CM-107	E Cap	
C24	QEE41CM-106	T Cap	
C25	〃 -106	〃	
C26	QET41CM-476	E Cap	
C27	QFN41HK-332	MY Cap	
C28	QEE41CM-106	T Cap	
C29	QCS11HK-471	C Cap	
C30	–	–	
C31	QEE41CM-226	T Cap	
C32	QFP42AF-162M	PP Cap	
C33	QFN41HK-104	MY Cap	
C34	QET41CM-106	E Cap	
C35	QFM41HJ-152M	MY Cap	
C36	QFN41HK-152	〃	
C37	〃 -102	〃	
C38	〃 -103	〃	
C39	QCF11HP-103	C Cap	
C40	QET41EM-107	E Cap	
C41	〃 -476	〃	
C42	QFN41HK-103	MY Cap	
C43	QFM41HJ-333M	〃	
C44	QET41CM-476	E Cap	
C45	〃 -106	〃	
C46	〃 -107	〃	

Symbol No.	Part No.	Part Name	Description
C47	QFN41HK-102	MY Cap	
C48	QCF11HP-103	C Cap	
C49	QET41CM-107	E Cap	
C50	QFN41HK-103	MY Cap	
C51	QFM41HJ-103M	"	
C52	QFN41HK-333	"	
C53	QET41CM-107	E Cap	
C54	QCF11HP-103	C Cap	
C55	QEE41CM-226	T Cap	
C56	QFP42AF-162M	PP Cap	
C57	QFN41HK-103	MY Cap	
C58	QFP42AF-122M	PP Cap	
C59	" -122M	"	
C60	" -242M	"	
C61	QET41CM-106	E Cap	
C62	QFN41HK-472	MY Cap	
C63	QET41CM-106	E Cap	
C64	QFN41HK-472	MY Cap	
C65	QFM41HJ-473M	"	
C66	QFN41HK-332	"	
C67	QFP42AF-154M	PP Cap	
C68	QFN41HK-104	MY Cap	
C69	QEE41CM-106	T Cap	
C70	QET41CM-227	E Cap	
C71	QCF11HP-103	C Cap	
C72	–	–	
C73	QET41EM-476	E Cap	
C74	QCF11HP-103	C Cap	
C75	QEE41EM-475	T Cap	
C76	" -475	"	
C77	QFN41HK-103	MY Cap	
C78	QCF11HP-102	C Cap	
C79	QET41HM-475	E Cap	
C80	QCF11HP-102	C Cap	
C81	QET41HM-475	E Cap	
C82	QET41CM-476	"	
C83	QCF11HP-103	C Cap	
C84	QET41CM-107	E Cap	
C85	QCF11HP-103	C Cap	
C86	QET41EM-107	E Cap	
C87	–	–	
C88	QET41CM-106	E Cap	
C89	QFN41HK-152	MY Cap	
C90	QET41CM-476	E Cap	
C91	QFN41HK-103	MY Cap	
C92	" -103	"	
C93	" -683	"	
C94	QCF11HP-223	C Cap	
C95	QFP42AF-122M	PP Cap	
C96	" -242M	"	
C97	" -122M	"	
⚠L 1	PU48530-271K	Peaking Coil	
⚠L 2	" -271K	"	
⚠L 3	" -271K	"	
⚠L 4	" -271K	"	
⚠L 5	" -271K	"	
⚠L 6	" -271K	"	
⚠L 7	" -271K	"	
⚠L 8	" -271K	"	

Symbol No.	Part No.	Part Name	Description
J221	PU50715-6	Female Conn.	
J212	" -18	"	
J213	" -18	"	
	PU45908-1	Test Pin	TP-1 – TP-27
	PU32908	Servo P.W.B. Stay	
	GBST3008Z	TH. Tap. Screw	

8.5.8 Drum Servo Circuit Board Ass'y 2 2 .... ⚠ PU21431A

Symbol No.	Part No.	Part Name	Description
IC 1	8VT04	Integrated Circuit	
IC 2	AN301	"	
IC 3	SM6430C	"	
IC 4	TC4066BP	"	
IC 5	UPC1458C	"	
IC 6	AN6344	"	
IC 7	TC4069UBP	"	
IC 8	TC4011BP	"	
IC 9	TC4066BP	"	
IC10	"	"	
IC11	"	"	
IC12	"	"	
IC13	HA17555PS	"	
IC14	TC4030BP	"	
IC15	UPC358C	"	
Q 1	2SD636R,S	Transistor	
Q 2	2SB641R,S	"	
Q 3	2SD636R,S	"	
Q 4	"	"	
Q 5	"	"	
Q 6	"	"	
Q 7	2SA733Q,P,K	"	
Q 8	2SC945Q,P	"	
Q 9	2SD636R,S	"	
Q10	"	"	
Q11	2SA733Q,P,K	"	
Q12	2SC945Q,P	"	
Q13	2SB772Q,P	"	
Q14	2SA733Q,P,K	"	
Q15	2SC945Q,P	"	
Q16	"	"	
Q17	2SC1983R	"	
Q18	2SB772Q,P	"	
Q19	2SA733Q,P,K	"	
Q20	2SC945Q,P	"	
Q21	"	"	
Q22	2SC1983R	"	
Q23	2SC2259F,G	"	
Q24	2SD636R,S	"	
Q25	2SB772Q,P	"	
Q26	2SA733Q,P,K	"	
Q27	2SC945Q,P	"	
Q28	"	"	
Q29	2SC1983R	"	
Q30	2SB772Q,P	"	
Q31	2SA733Q,P,K	"	
Q32	2SC945Q,P	"	
Q33	"	"	
Q34	2SC1983R	"	
Q35	2SB641R,S	"	
Q36	2SD636R,S	"	
Q37	2SK30AO	"	
Q38	2SD636R,S	"	
Q39	2SK30AO	"	
Q40	2SD636R,S	"	
Q41	"	"	
Q42	2SK30AO	"	
Q43	2SD636R,S	"	
Q44	"	"	

Symbol No.	Part No.	Part Name	Description
D 1	1SS133	Diode	
D 2	"	"	
D 3	RD5.1EB2	Zener Diode	
D 4	1SS133	Diode	
D 5	"	"	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	"	"	
D12	"	"	
R 1	QRD167J-390	CR	
R 2	" -390	"	
R 3	" -223	"	
R 4	" -682	"	
R 5	" -154	"	
R 6	" -682	"	
R 7	" -274	"	
R 8	" -472	"	
R 9	" -103	"	
R10	" -473	"	
R11	" -102	"	
R12	" -224	"	
R13	" -473	"	
R14	" -473	"	
R15	" -103	"	
R16	" -332	"	
R17	" -104	"	
R18	" -102	"	
R19	" -103	"	
R20	QRD143J-475	"	
R21	QRD167J-154	"	
R22	" -222	"	
R23	" -472	"	
R24	" -563	"	
R25	" -104	"	
R26	" -183	"	
R27	QVP9A0B-473	VR	
R28	QRD167J-223	CR	
R29	" -473	"	
R30	" -104	"	
R31	" -223	"	
R32	" -392	"	
R33	" -223	"	
R34	" -104	"	
R35	" -222	"	
R36	" -392	"	
R37	" -473	"	
R38	" -681	"	
R39	" -151	"	
R40	" -223	"	
R41	" -104	"	
R42	" -823	"	
R43	" -123	"	
R44	" -392	"	
R45	" -473	"	
R46	" -222	"	
R47	" -123	"	
R48	" -681	"	
R49	" -153	"	

Symbol No.	Part No.	Part Name	Description
R50	QRD167J-124	CR	
R51	" -151	"	
R52	" -153	"	
R53	" -681	"	
R54	" -104	"	
R55	" -474	"	
R56	" -474	"	
R57	" -104	"	
R58	" -270	"	
R59	" -472	"	
R60	" -472	"	
R61	" -271	"	
R62	" -271	"	
R63	" -471	"	
R64	" -471	"	
R65	QRX029J-R82G	MFR	
R66	QRD167J-471	CR	
R67	" -471	"	
R68	" -102	"	
R69	" -104	"	
R70	" -474	"	
R71	" -474	"	
R72	" -104	"	
R73	" -270	"	
R74	" -472	"	
R75	" -472	"	
R76	" -271	"	
R77	" -271	"	
R78	" -331	"	
R79	" -103	"	
R80	" -823	"	
R81	" -224	"	
R82	" -823	"	
R83	" -103	"	
R84	" -271	"	
R85	" -272	"	
R86	" -394	"	
R87	" -472	"	
R88	" -564	"	
R89	" -105	"	
R90	" -105	"	
R91	QVP9A0B-683	VR	
R92	—	—	
R93	—	—	
R94	QRV143F-8251	CMF R	
R95	QVP9A0B-473	VR	
R96	QRD167J-223	CR	
R97	QVP9A0B-472	VR	
R98	—	—	
R99	—	—	
R100	QRV143F-8251	CMF R	
R101	QVP9A0B-473	VR	
R102	QRD167J-223	CR	
R103	QVP9A0B-154	VR	
R104	QRV143F-3922	CMF R	
R105	QRD167J-224	CR	
R106	" -154	"	
R107	" -474	"	
R108	QRV143F-7151	CMF R	
R109	" -3572	"	
R110	QRV143F-4641	CR	
R111	" -3481	"	
R112	" -224	"	

Symbol No.	Part No.	Part Name	Description
R113	QRD167J-561	CR	
R114	QVP9A0B-102	VR	
R115	QRD167J-682	CR	
R116	QVP9A0B-473	VR	
R117	QRV143F-3322	CMF R	
R118	QRD167J-1303	CR	
R119	QRV143F-2552	CMF R	
R120	QVP9A0B-473	VR	
R121	QRV143F-2942	CMF R	
R122	QRD167J-1303	CR	
R123	" -101	"	
R124	QRV143F-2611	CMF R	
R125	" -5491	"	
R126	" -5112	"	
R127	" -1152	"	
R128	QVP9A0B-682	VR	
R129	QRD167J-1003	CR	
R130	" -274	"	
R131	" -393	"	
R132	" -103	"	
R133	" -103	"	
R134	" -273	"	
R135	" -103	"	
R136	" -562	"	
R137	" -223	"	
R138	" -822	"	
R139	" -223	"	
R140	" -223	"	
R141	" -103	"	
R142	" -472	"	
R143	" -474	"	
R144	" -223	"	
R145	" -103	"	
R146	" -184	"	
R147	" -103	"	
R148	" -472	"	
R149	" -103	"	
R150	" -104	"	
R151	" -223	"	
R152	" -473	"	
R153	" -224	"	
R154	" -102	"	
R155	QRV143F-3573	CMF R	
R156	" -3573	"	
R157	" -1783	"	
R158	QRD167J-103	CR	
R159	QRV143F-2943	CMF R	
R160	" -1473	"	
R161	" -2943	"	
R162	QRD167J-103	CR	
R163	" -182	"	
R164	" -330	"	
R165	" -821	"	
R166	" -183	"	
R167	" -562	"	
R168	" -222	"	
R169	" -470	"	
R170	" -821	"	
R171	" -103	"	
R172	" -332	"	
R173	" -103	"	
R174	" -101	"	
R175	" -104	"	

Symbol No.	Part No.	Part Name	Description
R176	QRD167J-223	CR	
R177	" -104	"	
R178	" -473	"	
R179	" -103	"	
R180	" -332	"	
R181	" -103	"	
R182	" -103	"	
R183	" -103	"	
C 1	QET41CM-476	E Cap	
C 2	" -476	"	
C 3	QET41CM-476	"	
C 4	QCF11HP-223	C Cap	
C 5	QET41CM-476	E Cap	
C 6	QCS11HK-151	C Cap	
C 7	" -220	"	
C 8	QET41HM-474	E Cap	
C 9	QET41CM-227	"	
C10	QCF11HP-103	C Cap	
C11	QFN41HK-103	MY Cap	
C12	QFN41HJ-102M	"	
C13	QET41HM-105	E Cap	
C14	" -105	"	
C15	QET41CM-337	"	
C16	QCF11HP-103	C Cap	
C17	QCS11HK-220	"	
C18	" -220	"	
C19	QFN41HK-103	MY Cap	
C20	QET41CM-227	E Cap	
C21	QCF11HP-103	C Cap	
C22	QFN41HK-103	MY Cap	
C23	QFN41HJ-103M	"	
C24	" -152M	"	
C25	QET41CM-227	E Cap	
C26	QCF11HP-103	C Cap	
C27	QET41CM-106	E Cap	
C28	QET41EM-475	"	
C29	" -475	"	
C30	QFN41HK-103	MY Cap	
C31	" -103	"	
C32	QEN41CM-475	NP Cap	
C33	" -475	"	
C34	QCF11HP-223	C Cap	
C35	QET41HM-105	E Cap	
C36	QET41CM-107	"	
C37	QCF11HP-103	C Cap	
C38	QET41HM-105	E Cap	
C39	QFN41HJ-104M	MY Cap	
C40	QFN41HK-103	"	
C41	QET41HM-105	E Cap	
C42	" -105	"	
C43	QFN41HJ-393M	MY Cap	
C44	" -393M	"	
C45	" -103M	"	
C46	QCS11HK-330	C Cap	
C47	QFP42AF-273M	PP Cap	
C48	QFN41HK-104	MY Cap	
C49	QCF11HP-103	C Cap	
C50	QET41CM-337	E Cap	
C51	QFN41HK-104	MY Cap	
C52	QFF42AF-103M	PP Cap	
C53	QFM41HJ-103M	MY Cap	

Symbol No.	Part No.	Part Name	Description
C54	QFP42AF-183M	PP Cap	
C55	QEE41CM-106	T Cap	
C56	QFP42AF-183M	PP Cap	
C57	" -183M	"	
C58	" -363M	"	
C59	QFN41HK-124	MY Cap	
C60	QET41CM-227	E Cap	
C61	QCF11HP-103	C Cap	
C62	QET41CM-227	E Cap	
C63	QCF11HP-103	C Cap	
C64	QET41HM-105	E Cap	
C65	QET41EM-475	"	
C66	QET41HM-105	"	
C67	QET41EM-475	"	
C68	QFN41HJ-223M	MY Cap	
C69	QCF11HP-223	C Cap	
C70	QET41EM-476	E Cap	
C71	QFN41HK-104	M Cap	
C72	–	–	
C73	QFP42AF-183M	PP Cap	
C74	" -183M	"	
C75	" -363M	"	
C76	QEE41CM-106	T Cap	
C77	" -106	"	
⚠ L 1	PU49995-221	Coil	
⚠ L 2	" -271	"	
⚠ L 3	" -271	"	
⚠ L 4	" -271	"	
⚠ L 5	" -221	"	
⚠ L 6	PU30284-51R	Choke Coil	
⚠ L 7	PU49995-271	Coil	
⚠ L 8	" -271	"	
LPF 1	PU47681	L.P.F.	
X 1	PU47220	Crystal	
J221	PU50715-15	Female Connector	
J222	" -14	"	
J223	" -14	"	
SW1	PU49847	Slide Switch	
	PU50766	Test Pin	
	PU45908		
	PU32908	Servo P.W.B. Stay	
	GBST3006Z	TH. Tap. Screw	
	PU547733	X'TAL OSC PWB	
IC 16	SM6430C		
R184	QRD143J-475	CR	
R185	QRD167J-154	"	
C 78	QCS11HK-390	C Cap	
C 79	" -390	"	
X 2	PU46386		
	PU54747	STUD	

8.5.9 Mother Circuit Board Ass'y 2 3 PU21432A

Symbol No.	Part No.	Part Name	Description
P231	PU50714-6	Male Connector	
P232	" -18	"	
P233	" -16	"	
P234	" -18	"	
P235	" -18	"	
P236	" -6	"	
P237	" -15	"	
P238	" -14	"	
P239	" -14	"	
P240	PU43351-114	Cap. Housing	
P241	" -118	"	
P242	" -115	"	
P243	" -6	"	
P244	" -6	"	
P245	" -5	"	
P246	" -4	"	
P247	" -3	"	
P248	" -5	"	
P249	" -4R	"	
P250	" -4	"	
P251	" -4Y	"	
P252	" -2	"	
P253	" -2R	"	
P254	" -4	"	
P255	" -2	"	
P256	" -2Y	"	
P257	" -102	"	
	PU32910	M. P.W.B. Stay	
	PU47876	P.W.B. HOLDER	
	PU33641	P.W.B. Guide	
	GBST3008Z	TH. Tap. Screw	
	SDSA3008Z	"	

8.5.10 System Control Circuit Board Ass'y 3 0 .... ⚠ PU50648A-6

Symbol No.	Part No.	Part Name	Description
IC 1	TMS1025N2LL	Integrated Circuit	
IC 2	UPC1458C	"	
⚠ IC 3	UPC78M05H	"	
IC 4	–	–	
IC 5	UPC1458C	Integrated Circuit	
IC 6	"	"	
IC 7	TC4066BP	"	
IC 8	UPD4584BC	"	
IC 9	TC4011BP	"	
IC10	M54519P	"	or UPA2004C
IC11	TC4069UBP	"	
IC12	–	–	
IC13	TC4011BP	Integrated Circuit	
IC14	UPD554C-036	"	
IC15	TC4029BP	"	
IC16	TC4011BP	"	
IC17	M54519P	"	or UPA2004C
IC18	TMS1025N2LL	"	
IC19	"	"	
IC20	M54533P	"	
IC21	M54519P	"	or UPA2004C
IC22	M54519P	"	or UPA2004C
IC23	TC4069UBP	"	
IC24	M54519P	"	or UPA2004C
IC25	UPD553C-143	"	
IC26	M50117AP	"	
IC27	M54519P	"	or UPA2004C
IC28	HA17555PS	"	
IC29	15VT01	"	
IC30	M54519P	"	or UPA2004C
IC31	"	"	or "
IC32	TC4069UBP	"	
Q 1	2SD636Q,R	Transistor	
Q 2	2SD313D,E	"	
Q 3	–	–	
Q 4	2SD636Q,R	Transistor	
Q 5	"	"	
Q 6	–	–	
Q 7	–	–	
Q 8	2SB641Q,R	Transistor	
Q 9	2SA1020O,Y	"	
Q10	"	"	
Q11	"	"	
Q12	"	"	
Q13	"	"	
Q14	"	"	
Q15	"	"	
Q16	"	"	
Q17	"	"	
Q18	2SC2655O,Y	"	
Q19	2SB641Q,R	"	
Q20	2SA1020O,Y	"	
Q21	"	"	
Q22	2SC2655O,Y	"	
Q23	2SB641Q,R	"	
Q24	2SA1020O,Y	"	
Q25	"	"	
Q26	2SB641Q,R	"	
Q27	2SC2655O,Y	"	
Q28	2SA1020O,Y	"	
Q29	2SB641Q,R	"	

Symbol No.	Part No.	Part Name	Description
Q30	2SC2655O,Y	Transistor	
Q31	2SD636Q,R	"	
Q32	2SC2655O,Y	"	
Q33	2SB641Q,R	"	
Q34	"	"	
D 1	1SS148	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	"	"	
D 7	RD4.3EB2	Zener Diode	
D 8	RD2.4EB	"	
D 9	RD11EB3	"	
D10	RD6.8EB2	"	
D11	RD15EB2	"	
D12	1SS148	Diode	
D13	"	"	
D14	"	"	
D15	"	"	
D16	"	"	
D17	"	"	
D18	"	"	
D19	"	"	
D20	"	"	
D21	"	"	
D22	"	"	
D23	"	"	
D24	VO3C	"	
D25	"	"	
D26	1SS148	"	
D27	"	"	
D28	"	"	
D29	VO3C	"	
D30	"	"	
D31	1SS148	"	
D32	"	"	
D33	"	"	
D34	"	"	
D35	"	"	
D36	"	"	
D37	"	"	
D38	"	"	
D39	"	"	
D40	"	"	
D41	"	"	
D42	"	"	
R 1	QRD167J-272	CR	2.7 K 1/6 W, J
R 2	" -222	"	2.2 K " "
R 3	" -222	"	2.2 K " "
R 4	" -103	"	10 K " "
R 5	" -103	"	10 K " "
R 6	" -103	"	10 K " "
R 7	" -684	"	680 K " "
R 8	" -331	"	330 " "
R 9	" -103	"	10 K " "
R10	" -104	"	100 K " "
R11	" -104	"	100 K " "
R12	–	–	
R13	–	–	
R14	–	–	
R15	–	–	
R16	–	–	
R17	–	–	
R18	–	–	
R19	–	–	
R20	QRD167J-333	CR	33 K 1/6 W, J

Symbol No.	Part No.	Part Name	Description
R21	PU50306-202	VR	2 K
R22	" -502	"	5 K
R23	PU50306-203	VR	20 K
R24	" -103	"	10 K
R25	QRD167J-104	CR	100 K 1/6 W, J
R26	" -102	"	1 K " "
R27	–	–	
R28	QRD167J-333	CR	33 K 1/6 W, J
R29	" -333	"	33 K " "
R30	" -333	"	33 K " "
R31	" -224	"	
R32	" -103	"	
R33	" -472	"	
R34	" -472	"	
R35	" -222	"	
R36	" -103	"	10 K 1/6 W, J
R37	" -103	"	10 K " "
R38	" -103	"	10 K " "
R39	" -472	"	100 K " "
R40	" -103	"	10 K " "
R41	" -221	"	220 " "
R42	" -221	"	220 " "
R43	QRG019J-680S	OMF R	68 1 W, J
R44	QRD167J-473	CR	47 K 1/6 W, J
R45	" -681	"	680 " "
R46	" -473	"	47 K " "
R47	" -102	"	1 K " "
R48	" -473	"	47 K " "
R49	" -103	"	10 K " "
R50	" -473	"	47 K " "
R51	" -681	"	680 " "
R52	QRD181K-102	"	1 K " "
R53	QRD167J-473	"	47 K " "
R54	" -681	"	680 " "
R55	" -473	"	47 K " "
R56	" -102	"	1 K " "
R57	" -473	"	47 K " "
R58	" -103	"	10 K " "
R59	" -563	"	56 K " "
R60	" -104	"	100 K " "
R61	" -104	"	100 K " "
R62	" -104	"	100 K " "
R63	" -103	"	10 K " "
R64	" -103	"	10 K " "
R65	" -103	"	10 K " "
R66	" -333	"	33 K " "
R67	" -332	"	3.3 K " "
R68	" -104	"	100 K " "
R69	" -103	"	10 K " "
R70	" -103	"	10 K " "
R71	" -154	"	150 K " "
R72	" -104	"	100 K " "
R73	" -103	"	10 K " "
R74	" -104	"	100 K " "
R75	" -104	"	100 K " "
R76	" -104	"	100 K " "
R77	" -681	"	680 " "
R78	" -152	"	1.5 K " "
R79	" -103	"	10 K " "
R80	" -103	"	10 K " "
R81	" -272	"	2.7 K " "
R82	" -272	"	2.7 K " "
R83	" -103	"	10 K " "
R84	" -105	"	1 M " "
R85	" -224	"	220 K " "

Symbol No.	Part No.	Part Name	Description
R86	QRD167J-224	CR	220 K 1/6 W, J
R87	″ -103	″	10 K ″ ″
R88	″ -103	″	10 K ″ ″
R89	″ -684	″	680 K ″ ″
R90	″ -683	″	68 K ″ ″
R91	″ -104	″	100 K ″ ″
R92	″ -104	″	100 K ″ ″
R93	″ -104	″	100 K ″ ″
R94	″ -102	″	1 K ″ ″
R95	″ -473	″	47 K ″ ″
R96	″ -102	″	1 K ″ ″
R97	″ -473	″	47 K ″ ″
R98	″ -103	″	10 K ″ ″
R99	″ -473	″	47 K ″ ″
R100	″ -102	″	1 K ″ ″
R101	″ -473	″	47 K ″ ″
R102	″ -473	″	47 K ″ ″
⚠ R103	QRG019J-470S	OMF R	47 1 W, J
R104	QRD167J-102	CR	1 K 1/6 W, J
R105	″ -103	″	10 K ″ ″
R106	″ -473	″	47 K ″ ″
R107	″ -102	″	1 K ″ ″
R108	″ -473	″	47 K ″ ″
R109	″ -222	″	2.2 K ″ ″
R110	″ -222	″	2.2 K ″ ″
R111	″ -823	″	82 K ″ ″
R112	″ -104	″	100 K ″ ″
R113	″ -104	″	100 K ″ ″
R114	″ -104	″	100 K ″ ″
R115	″ -104	″	100 K ″ ″
R116	″ -103	″	10 K ″ ″
R117	″ -103	″	10 K ″ ″
R118	″ -104	″	100 K ″ ″
R119	″ -104	″	100 K ″ ″
R120	″ -104	″	100 K ″ ″
R121	″ -104	″	100 K ″ ″
R122	″ -104	″	100 K ″ ″
R123	″ -104	″	100 K ″ ″
R124	″ -472	″	4.7 K ″ ″
R125	″ -182	″	1.8 K ″ ″
R126	″ -104	″	100 K ″ ″
R127	″ -103	″	10 K ″ ″
R128	″ -332	″	3.3 K ″ ″
R129	″ -474	″	470 K ″ ″
R130	″ -104	″	100 K ″ ″
R131	″ -103	″	10 K ″ ″
R132	″ -123	″	12 K ″ ″
R133	″ -562	″	5.6 K ″ ″
R134	″ -104	″	100 K ″ ″
R135	″ -333	″	33 K ″ ″
R136	″ -103	″	10 K ″ ″
R137	″ -331	″	330 ″ ″
R138	″ -224	″	220 K ″ ″
R139	″ -103	″	10 K ″ ″
R140	″ -333	″	33 K ″ ″
R141	″ -333	″	33 K ″ ″
R142	″ -683	″	68 K ″ ″
R143	″ -821	″	820 ″ ″
R144	″ -821	″	820 ″ ″
R145	″ -103	″	10 K ″ ″
R146	″ -103	″	10 K ″ ″
R147	″ -102	″	1 K ″ ″
R148	″ -103	″	10 K ″ ″

Symbol No.	Part No.	Part Name	Description
R149	QRD167J-103	CR	10 K 1/6 W, J
R150	″ -104	″	100 K ″ ″
R151	″ -224	″	220 K ″ ″
R152	″ -105	″	1 M ″ ″
R153	″ -152	″	
R154	″ -681	″	
RA 1	EXB-P88104M	Resistor Array	
RA 2	″ -P88104M	″	
RA 3	″ -P84104M	″	
RA 4	″ -P88473M	″	
RA 5	″ -P88104M	″	
RA 6	″ -P88104M	″	
RM 1	EXB-RB7222M	R. Module	
RM 2	″ -RB7222M	″	
RM 3	″ -RB7222M	″	
RM 4	″ -RB7222M	″	
RM 5	″ -RB7222M	″	
C 1	QET41CR-476	E Cap	47 16 V
C 2	QCF11EZ-472	C Cap	0.0047 25 V
C 3	″ -472	″	0.0047 ″
C 4	QET41CR-476	E Cap	47 16 V
C 5	″ -476	″	47 ″
C 6	QFN41HK-103	MY Cap	0.01 50 V
C 7	QET41CR-106	E Cap	10 16 V
C 8	″ -336	″	33 ″
C 9	″ -336	″	33 ″
C10	QFN41HK-182	MY Cap	0.0018 50 V
C11	QCF11EZ-472	C Cap	0.0047 25 V
C12	″ -472	″	0.0047 ″
C13	″ -472	″	0.0047 ″
C14	QCS11HJ-101	″	100 P 50 V
C15	″ -101	″	100 P ″
C16	QCF11EZ-472	″	0.0047 25 V
C17	″ -472	″	0.0047 ″
C18	″ -472	″	0.0047 ″
C19	QEN41CM-106	E Cap	10 16 V
C20	″ -106	″	10 ″
C21	QET41CR-336	″	33 ″
C22	″ -106	″	10 ″
C23	QFN41HK-154	MY Cap	0.15 50 V
C24	QCS11HJ-121	C Cap	120 ″
C25	″ -471	″	470 ″
C26	QCF11EZ-472	″	0.0047 25 V
C27	QCS11HJ-101	″	100 50 V
C28	″ -101	″	100 ″
C29	QEN41HM-105	NP Cap	1 ″
C30	QCF11EZ-472	C Cap	0.0047 25 V
C31	″ -472	″	0.0047 ″
C32	—	—	
C33	QCF11EZ-472	C Cap	0.0047 25 V
C34	″ -472	″	0.0047 ″
C35	QCS11HJ-121	″	120 50 V
C36	″ -471	″	470 ″
C37	QFN41HK-103	MY Cap	0.01 ″
C38	QET41HR-105	E Cap	1 ″
C39	QET41CR-476	″	47 16 V
C40	QEC81CM-227	″	220 ″
C41	QFN41HK-103	MY Cap	0.01 50 V
C42	″ -103	″	0.01 ″
C43	″ -103	″	0.01 ″

Symbol No.	Part No.	Part Name	Description
C44	QET41HR-474	E Cap	0.47 50 V
C45	QET41CR-226	"	22 "
C46	QFN41HK-104	MY Cap	0.1 "
C47	" -223	"	0.022 "
C48	" -223	"	0.022 "
C49	QCF11EZ-472	C Cap	0.0047 25 V
C50	" -472	"	0.0047 "
C51	QFN41HK-472	MY Cap	0.0047 50 V
C52	QET41CR-226	E Cap	22 16 V
C53	" -106	"	10 "
C54	QST41HM-225	"	
C55	QET41CM-106		
⚠L 1	PU30284-1R	Choke Coil	
CF 1	PU50224	Ceramic Filter	
CF 2	PU49487-1	"	
CF 3	PU50224	"	
TP 1	PU50766	Test Pin	
TP 2	"	"	
TP 3	"	"	
TP 4	"	"	
TP 5	"	"	
P301	PU43351-6	Cap Housing	
P302	" -2R	"	
P303	" -2Y	"	
P304	" -3	"	
P305	" -2R	"	
P306	" -2	"	
P307	" -7	"	
P308	" -2	"	
P309	" -2Y	"	
P310	" -2Y	"	
P311	" -2	"	
P312	" -3	"	
P313	" -3Y	"	
P314	" -3R	"	
P315	" -3	"	
P316	" -14	"	
P317	" -5	"	
P318	" -9	"	
P319	" -15	"	
P320	" -15	"	
P321	" -10	"	
P322	" -4	"	
P323	" -4	"	
P324	" -11	"	
P325	" -9	"	
P326	" -3	"	

8.5.11 Junction Circuit Board Ass'y 3 3

BR-6400TR . . . . ⚠PU50649A

BP-5300TR . . . . ⚠PU50649B

Symbol No.	Part No.	Part Name	Description
IC 1	M50115AP	Integrated Circuit	
IC 2	TC4066BP	"	
IC 3	TC4011BP	"	
IC 4	TC4066BP	"	
★ IC 5	TC4001BP	"	
IC 6	TC4011BP	"	
IC 7	TC4069UBP	"	
IC 8	M54519	"	or UPA2004C
IC 9	TC4071BP	"	
★ Q 1	2SD636Q,R	Transistor	
★ D 1	MA150	Diode	
★ D 2	"	"	
★ D 3	"	"	
★ D 4	"	"	
★ D 5	"	"	
★ D 6	"	"	
★ D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	VO3C	"	
D11	"	"	
★ D12	MA150	"	
D13	VO3C	"	
D14	"	"	
D15	"	"	
D16	"	"	
R 1	QRD167J-103	CR	10 K 1/6 W, J
R 2	" -222	"	2.2 K " "
R 3	" -222	"	2.2 K " "
R 4	" -222	"	2.2 K " "
R 5	" -222	"	2.2 K " "
R 6	" -222	"	2.2 K " "
R 7	" -222	"	2.2 K " "
R 8	" -222	"	2.2 K " "
★ R 9	" -222	"	2.2 K " "
★ R10	" -222	"	2.2 K " "
★ R11	" -222	"	2.2 K " "
R12	" -104	"	100 K " "
R13	" -104	"	100 K " "
R14	" -104	"	100 K " "
R15	" -104	"	100 K " "
R16	" -104	"	100 K " "
R17	" -104	"	100 K " "
★ R18	" -104	"	100 K " "
★ R19	" -104	"	100 K " "
★ R20	" -222	"	2.2 K " "
R21	" -222	"	2.2 K " "
R22	" -222	"	2.2 K " "
R23	" -103	"	10 K " "
R24	" -103	"	10 K " "
R25	" -104	"	100 K " "
R26	" -104	"	100 K " "
R27	" -333	"	33 K " "
★ R28	" -104	"	100 K " "
R29	" -104	"	100 K " "
★ R30	" -274	"	270 K " "
R31	" -104	"	100 K " "
R32	" -473	"	47 K " "
★ R33	" -104	"	100 K " "
★ R34	" -104	"	100 K " "
R35	" -104	"	100 K " "

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
★ R36	QRD167J-104	CR	100 K 1/6 W, J
R37	" -222	"	2.2 K " "
R38	" -222	"	2.2 K " "
R39	" -391	"	390 " "
R40	" -391	"	390 " "
R41	" -391	"	390 " "
R42	" -103	"	10 K " "
R43	" -222	"	2.2 K " "
R44	" -222	"	2.2 K " "
R45	" -103	"	10 K " "
★ R46	" -103	"	10 K " "
★ R47	" -103	"	10 K " "
R48	" -392	"	3.9 K " "
R49	" -222	"	2.2 K " "
C 1	QCS11HJ-391	C Cap	390 P 50 V
C 2	" -391	"	390 P "
C 3	QCF11EZ-472	"	0.0047 25 V
C 4	QET41HR-105	E Cap	1 50 V
C 5	QET41CR-107	"	100 16 V
C 6	QFN41HK-332	MY Cap	0.0033 50 V
C 7	" -332	"	0.0033 "
C 8	QET41CR-106	E Cap	10 16 V
C 9	" -106	"	10 "
C10	" -336	"	33 "
C11	" -107	"	100 "
C12	" -336	"	33 "
CF 1	PU49487	Ceramic Filter	
P331	PU43351-9	Cap Housing	
P331	" -10	"	
★ P332	" -2	"	
★ P333	" -3	"	
P334	" -7	"	
P335	" -14	"	
⚠ L 1	PU49993-102	Coil	

★ symbol : Not used in BP-5300TR

8.5.12 Counter Circuit Board Ass'y 3 4

. . . . ⚠ PU50650A-3

Symbol No.	Part No.	Part Name	Description
IC 1	UPD554C-058	Integrated Circuit	
IC 2	UPD550C-055	"	
Q 1	2SB641Q,R	Transistor	
Q 2	"	"	
D 1	MA150	Diode	
D 2	RD6.8EB2	Zener Diode	
D 3	RD8.2EB2	"	
D 4	MA150	Diode	
R 1	QRD167J-333	CR	33 K 1/6 W, J
R 2	" -103	Zener Dioed	10 K " "
R 3	" -333	"	33 K " "
R 4	" -391	Diode	390 " "
R 5	" -823	"	82 K " "
R 6	" -333	"	33 K " "
R 7	" -104	"	100 K " "
R 8	" -104	"	100 K " "
R 9	" -104	"	100 K " "
R10	" -103	"	10 K " "
R11	" -105	"	1 M " "
R12	" -105	"	1 M " "
R13	" -104	"	100 K " "
R14	" -222	"	2.2 K " "
R15	" -222	"	2.2 K " "
R16	" -102	"	1.0 K " "
RA 1	EXB-P84104M	Resistor Array	
RA 2	" -P84104M	"	
RA 3	" -P84104M	"	
RA 4	" -P88334M	"	
RA 5	" -P88334M	"	
C 1	QET41HR-475	E Cap	4.7 50 V
C 2	" -474	"	0.47 "
C 3	QET41CR-226	"	22 16 V
C 4	QFN41HK-103	MY Cap	0.01 50 V
C 5	QCS11HJ-471	C Cap	470 "
C 6	" -121	"	120 "
C 7	" -471	"	470 "
C 8	" -121	"	120 "
C 9	QFN41HK-392	MY Cap	0.0039 "
C10	QET41CR-476	E Cap	47 16 V
C11	QCF11EZ-472	C Cap	0.0047 25 V
C12	" -472	"	0.0047 "
C13	QET41CR-226	E Cap	22 16 V
C14	QFN41HK-104	MY Cap	0.1 50 V
⚠ L 1	PU30284-1R	Choke Coil	
CF 1	PU50224	Ceramic Filter	
CF 2	"	"	
⚠	PU51171 PU51623	DC-DC Converter Shield Case	

Symbol No.	Part No.	Part Name	Description
S1–2	PU47034	Push Switch	
	PU50660-2	Fluorescent Display Panel	
	PU50515	Display Holder	
	SDSA2608ZS	Tapping Screw	
	PU43351-111	Cap Housing	

8.5.13 Audio Circuit Board Ass'y $\boxed{4}\boxed{0}$

BR-6400TR . . . . ⚠ PU10530A
BP-5300TR . . . . ⚠ PU10530B

Symbol No.	Part No.	Part Name	Description
IC 1	HA12005	Integrated Circuit	
IC 2	NE646B	"	or NE646N
★ IC 3	10VT03	"	
IC 4	HA12005	"	
IC 5	NE646B	"	or NE646N
★ IC 6	10VT03	"	
IC 7	HA12006	"	
IC 8	UPC1458C	"	
IC 9	TC4066BP	"	
★ Q 1	2SC2021R	Transistor	
★ Q 2	"	"	
★ Q 3	"	"	
★ Q 4	2SK30A-O	FET	
★ Q 5	2SC2021R	Transistor	
★ Q 6	"	"	
Q 7	2SC2021LNS	"	
Q 8	"	"	
★ Q 9	2SC2021R	"	
★ Q10	"	"	
★ Q11	"	"	
★ Q12	2SK30A-O	FET	
★ Q13	2SC2021R	Transistor	
★ Q14	"	"	
Q15	2SC2021LNS	"	
Q16	"	"	
⚠ Q17	2SC2655Y	"	
⚠★ Q18	2SB788T	"	
⚠★ Q19	"	"	
⚠★ Q20	"	"	
⚠★ Q21	"	"	
⚠★ Q22	"	"	
⚠★ Q23	"	"	
★ Q24	2SC2021R	"	
★ Q25	"	"	
Q26	"	"	
Q27	"	"	
Q30	2SC2021R	Transistor	
★ D 1	MA150	Diode	
D 2	"	"	
★ D 3	"	"	
★ D 4	"	"	
D 5	"	"	
★ D 6	"	"	
★ D 7	MA162	"	
★ D 8	"	"	
★ D 9	MA150	"	
★ D10	"	"	
★ D11	"	"	
★ D12	"	"	
★ D13	"	"	
★ D14	"	"	
★ D15	"	"	
★ D16	"	"	
★ D17	"	"	
★ D18	"	"	
★ D19	"	"	
D20	"	"	
★ D21	OA90	"	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
D22	OA90	Diode	
D23	″	″	
D24	″	″	
★D25	MA150	″	
★R 1	QRD167J-103	CR	10 K 1/6 W, J
★R 2	″ -123	″	12 K ″ ″
★R 3	″ -122	″	1.2 K ″ ″
★R 4	″ -123	″	12 K ″ ″
★R 5	″ -104	″	100 K ″ ″
★R 6	″ -104	″	100 K ″ ″
★R 7	″ -822	″	8.2 K ″ ″
★R 8	″ -103	″	10 K ″ ″
★R 9	″ -682	″	6.8 K ″ ″
★R10	″ -563	″	56 K ″ ″
★R11	″ -101	″	100 ″ ″
★R12	″ -563	″	56 K ″ ″
★R13	″ -122	″	1.2 K ″ ″
★R14	″ -563	″	56 K ″ ″
★R15	″ -104	″	100 K ″ ″
R16	″ -682	″	6.8 K ″ ″
R17	″ -332	″	3.3 K ″ ″
R18	″ -332	″	3.3 K ″ ″
★R19	″ -104	″	100 K ″ ″
★R20	″ -182	″	1.8 K ″ ″
R21	″ -393	″	39 K ″ ″
★R22	″ -151	″	150 ″ ″
★R23	″ -123	″	12 K ″ ″
★R24	″ -123	″	12 K ″ ″
R25	″ -102	″	1 K ″ ″
R26	″ -393	″	39 K ″ ″
★R27	″ -681	″	680 ″ ″
R28	QVP4AOB-152	VR	1.5 K
R29	QRD167J-822	CR	8.2 K 1/6 W, J
R30	QVP4AOB-333	VR	33 K
R31	QRD167J-333	CR	33 K 1/6 W, J
R32	″ -181	″	180 ″ ″
★R33	″ -562	″	5.6 K ″ ″
R34	″ -181	″	180 ″ ″
R35	″ -102	″	1 K ″ ″
R36	″ -102	″	1 K ″ ″
R37	″ -184	″	180 K ″ ″
★R38	″ -181	″	180 ″ ″
R39	—	—	
R40	QRD167J-473	CR	47 K 1/6 W, J
R41	″ -274	″	270 K ″ ″
R42	″ -332	″	3.3 K ″ ″
R43	″ -124	″	120 K ″ ″
R44	″ -122	″	1.2 K ″ ″
⚠R45	QRZ0054-330	FR	33
★R46	QRD167J-184	CR	180 K 1/6 W, J
★R47	″ -154	″	150 K ″ ″
★R48	QVP4AOB-333	VR	33 K
★R49	QRD167J-472	CR	4.7 K 1/6 W, J
★R50	″ -154	″	150 K ″ ″
★R51	″ -223	″	22 K ″ ″
★R52	″ -682	″	6.8 K ″ ″
★R53	QVP4AOB-331	VR	330
★R54	QRD167J-102	CR	1 K 1/6 W, J
★R55	″ -331	″	330 ″ ″
★R56	″ -223	″	22 K ″ ″
★R57	QVP4AOB-104	VR	100 K
★R58	QRD167J-102	CR	1 K 1/6 W, J
★R59	″ -103	″	10 K ″ ″
R60	″ -564	″	560 K ″ ″
R61	″ -473	″	47 K ″ ″
R62	″ -473	″	47 K ″ ″
R63	″ -222	″	2.2 K ″ ″
R64	″ -221	″	220 ″ ″
R65	″ -473	″	47 K ″ ″
R66	″ -222	″	2.2 K ″ ″
R67	″ -221	″	220 ″ ″
R68	″ -393	″	39 K ″ ″
R69	″ -183	″	18 K ″ ″
★R70	QVP4AOB-102	VR	1 K
★R71	QRD167J-823	CR	82 K 1/6 W, J
⚠R72	QRZ0054-330	FR	33
★R73	QRD167J-223	CR	22 K 1/6 W, J
★R74	″ -333	″	33 K ″ ″
★R75	″ -103	″	10 K ″ ″
★R76	″ -123	″	12 K ″ ″
★R77	″ -122	″	1.2 K ″ ″
★R78	″ -822	″	8.2 K ″ ″
★R79	″ -104	″	100 K ″ ″
★R80	″ -104	″	100 K ″ ″
★R81	″ -123	″	12 K ″ ″
★R82	″ -103	″	10 K ″ ″
★R83	″ -101	″	100 ″ ″
★R84	″ -122	″	1.2 K ″ ″
★R85	″ -104	″	100 K ″ ″
R86	″ -682	″	6.8 K ″ ″
R87	″ -332	″	3.3 K ″ ″
R88	″ -332	″	3.3 K ″ ″
★R89	″ -104	″	100 K ″ ″
★R90	″ -182	″	1.8 K ″ ″
R91	″ -393	″	39 K ″ ″
★R92	″ -151	″	150 ″ ″
★R93	″ -123	″	12 K ″ ″
★R94	″ -123	″	12 K ″ ″
R95	″ -102	″	1 K ″ ″
R96	″ -393	″	39 K ″ ″
R97	QVP4AOB-152	VR	1.5 K
★R98	QRD167J-681	CR	680 1/6 W, J
R99	″ -822	″	8.2 K ″ ″
R100	QVP4AOB-333	VR	33 K
R101	QRD167J-333	CR	33 K 1/6 W, J
R102	″ -181	″	180 ″ ″
★R103	″ -562	″	5.6 K ″ ″
R104	″ -181	″	180 ″ ″
R105	″ -102	″	1 K ″ ″
R106	″ -102	″	1 K ″ ″
R107	″ -184	″	180 K ″ ″
★R108	″ -181	″	180 ″ ″
R109	″ -473	″	47 K ″ ″
R110	—	—	
R111	QRD167J-274	CR	270 K 1/6 W, J
R112	″ -332	″	3.3 K ″ ″
R113	″ -124	″	120 K ″ ″
R114	″ -122	″	1.2 K ″ ″
⚠R115	QRZ0054-330	FR	33
★R116	QRD167J-184	CR	180 K 1/6 W, J
★R117	″ -154	″	150 K ″ ″
★R118	QVP4AOB-333	VR	33 K
★R119	QRD167J-472	CR	4.7 K 1/6 W, J
★R120	″ -154	″	150 K ″ ″

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
★R121	QRD167J-223	CR	22 K 1/6 W, J
★R122	" -682	"	6.8 K " "
★R123	QVP4AOB-331	VR	330
★R124	QRD167J-102	CR	1 K 1/6 W, J
★R125	" -223	"	22 K " "
★R126	QVP4AOB-104	VR	100 K
★R127	QRD167J-331	CR	330 1/6 W, J
★R128	" -102	"	1 K " "
R129	" -564	"	560 K " "
R130	" -473	"	47 K " "
R131	" -473	"	47 K " "
R132	" -222	"	2.2 K " "
R133	" -221	"	220 " "
R134	" -473	"	47 K " "
R135	" -222	"	2.2 K " "
R136	" -221	"	220 " "
R137	" -393	"	39 K " "
R138	" -183	"	18 K " "
★R139	QVP4AOB-102	VR	1 K
★R140	QRD167J-823	CR	82 K 1/6 W, J
★R141	" -223	"	22 K " "
R142	" -122	"	1.2 K " "
★R143	" -392	"	3.9 K " "
★R144	" -562	"	5.6 K " "
★R145	" -471	"	470 " "
★R146	" -332	"	3.3 K " "
★R147	" -682	"	6.8 K " "
★R148	" -223	"	22 K " "
★R149	" -104	"	100 K " "
★R150	" -562	"	5.6 K " "
★R151	" -183	"	18 K " "
★R152	" -183	"	18 K " "
★R153	" -223	"	22 K " "
★R154	" -822	"	8.2 K " "
★R155	" -562	"	5.6 K " "
★R156	" -471	"	470 " "
★R157	" -122	"	1.2 K " "
★R158	" -183	"	18 K " "
★R159	" -271	"	270 " "
★R160	" -122	"	1.2 K " "
R161	" -103	"	10 K " "
R162	" -102	"	1 K " "
★R163	" -471	"	470 " "
★R164	" -122	"	1.2 K " "
R165	" -123	"	12 K " "
★R166	" -103	"	10 K " "
★R167	" -224	"	220 K " "
★R168	" -105	"	1 M " "
★R169	" -471	"	470 " "
★R170	" -681	"	680 " "
★R171	" -224	"	220 K " "
★R172	" -105	"	1 M " "
R173	" -271	"	270 " "
R174	" -272	"	2.7 K " "
R175	" -393	"	39 K " "
R176	" -101	"	100 " "
R177	—	—	
R178	QRD167J-101	CR	100 1/6 W, J
R179	" -101	"	100 " "
R180	" -682	"	6.8 K " "
R181	" -682	"	6.8 K " "
R182	" -103	"	10 K " "
R183	" -103	"	10 K " "

Symbol No.	Part No.	Part Name	Description
R184	QRD167J-821	CR	
R185	" -103	"	
R186	" -103	"	
R187	" -821	"	
R188	" -122	"	
R189	" -122	"	
R190	" -271	"	
R191	" -473	"	
R192	" -332	"	
R193	" -104	"	
R194	" -332	"	
R195	" -332	"	
R196	" -333	"	
R197	" -333	"	
R198	" -392	"	
R199	" -271	"	
R200	" -271	"	
R201	QVP4A0B-103	VR	
R202	" -103	"	
R203	QRD167J-103	CR	
R204	" -104	"	
R205	" -104	"	
R206	" -104	"	
R207	" -104	"	
R208	" -103	"	
R209	" -102	"	
⚠ R210	QRZ0054-330	FR	
★R211	QRD167J-183	CR	
⚠ R212	QRD167J-8R2	"	
R213	QRD167J-181	"	
R214	" -392	"	
R215	—	—	
R216	—	—	
R217	QRD167J-181	CR	
R218	" -392	"	
R219	—	—	
R220	—	—	
R221	QRD167J-822	CR	
R222	" -272	"	
R223	" -103	"	
R224	—	—	
R225	—	—	
R226	QRD167J-103	CR	
★C 1	QET41EM-475	E Cap	
★C 2	" -475	"	
★C 3	QET41CM-226	"	
★C 4	QET41HM-105	"	
★C 5	QET41AM-476	"	
★C 6	QET41CM-226	"	
★C 7	QET41EM-475	"	
★C 8	QET41CM-106	"	
★C 9	" -106	"	
C10	" -226	"	
★C11	" -106	"	
★C12	QET41AM-476	"	
★C13	QFN41HK-102N	MY Cap	
C14	QCS11HJ-471	C Cap	
★C15	QFN41HK-102N	MY Cap	
C16	" -102N	"	
C17	QET41CM-226	E Cap	
C18	QFN41HJ-823N	MY Cap	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
★C19	QET41CM-336	E Cap	
★C20	QFN41HK-102N	MY Cap	
C21	" -102N	"	
C22	QET41EM-335	E Cap	
C23	QET41CM-337	"	
C24	–	–	
C25	QFN41HK-562N	MY Cap	
★C26	" -102N	"	
C27	QET41EM-335	E Cap	
C28	QFN41HJ-562N	MY Cap	
C29	QFN41HK-222N	"	
C30	QET41CM-106	E Cap	
C31	QFN41HJ-472N	MY Cap	
C32	" -273N	"	
C33	" -334N	"	
C34	–	–	
C35	–	–	
C36	QFN41HJ-104N	MY Cap	
C37	QET41AM-227	E Cap	
C38	QET41CM-106	"	
C39	QFN41HK-122M	MY Cap	
C40	QFN41HJ-473N	"	
★C41	QET41EM-475	E Cap	
★C42	QET41CM-336	"	
★C43	QFN41HK-474N	MY Cap	
★C44	QFN41HJ-102N	"	
★C45	" -273N	"	
★C46	QET41HM-225	E Cap	
★C47	QCS11HJ-101	C Cap	
C48	" -821	"	
C49	QET41CM-337	E Cap	
★C50	QFN41HK-103N	MY Cap	
★C51	QET41EM-475	E Cap	
C52	QEB41CM-106	"	
C53	QET41EM-335	"	
C54	QET41AM-226	"	
C55	QET41EM-335	"	
C56	QET41AM-226	"	
C57	QET41EM-335	"	
★C58	QFN41HK-102N	MY Cap	
★C59	" -182N	"	
★C60	QET41EM-475	E Cap	
★C61	QET41CM-226	"	
★C62	QET41AM-476	"	
★C63	QET41HM-105	"	
★C64	QET41CM-226	"	
★C65	QEB41EM-475	"	
★C66	QET41CM-106	"	
C67	" -226	"	
★C68	QET41AM-476	"	
★C69	QFN41HK-102N	MY Cap	
C70	QCS11HJ-471	C Cap	
★C71	QFN41HK-102N	MY Cap	
C72	" -102N	"	
C73	QET41CM-226	E Cap	
C74	QFN41HJ-823N	MY Cap	
★C75	QET41CM-336	E Cap	
★C76	QFN41HK-102N	MY Cap	
C77	" -102N	"	
C78	QET41EM-335	E Cap	
C79	QET41CM-337	"	
C80	–	–	
C81	QFN41HK-562N	MY Cap	

★ symbol : Not used in BP-5300TR

Symbol No.	Part No.	Part Name	Description
★C82	QFN41HK-102N	MY Cap	
C83	QET41EM-335	E Cap	
C84	QFN41HJ-562N	MY Cap	
C85	QFN41HK-222N	"	
C86	QET41CM-106	E Cap	
C87	QFN41HJ-472N	MY Cap	
C88	" -273N	"	
C89	" -334N	"	
C90	–	–	
C91	–	–	
C92	QFN41HJ-104N	MY Cap	
C93	QET41AM-227	E Cap	
C94	QET41CM-106	"	
C95	QFN41HK-122N	MY Cap	
C96	QFN41HJ-473N	"	
★C97	QET41EM-475	E Cap	
★C98	QET41CM-336	"	
★C99	QFN41HK-474N	MY Cap	
★C100	QFN41HJ-102N	"	
★C101	QET41HM-225	E Cap	
★C102	QFN41HJ-273N	MY Cap	
★C103	QCS11HJ-101	C Cap	
C104	" -821	"	
C105	QET41CM-477	E Cap	
★C106	QFN41HK-103N	MY Cap	
★C107	QET41EM-475	E Cap	
C108	QEB41CM-106	"	
C109	QET41EM-335	"	
C110	QET41AM-226	"	
C111	QET41EM-335	"	
C112	QET41AM-226	"	
C113	QET41EM-335	"	
★C114	QFN41HK-102N	MY Cap	
★C115	" -182N	"	
C116	QET41CM-477	E Cap	
★C117	QET41EM-475	"	
★C118	QET41CM-226	"	
★C119	QET41EM-475	"	
★C120	" -475	"	
★C121	" -475	"	
C122	" -475	"	
C123	QET41CM-227	"	
C124	" -336	"	
C125	" -336	"	
C126	QEN41HM-225	NP Cap	
C127	" -225	"	
C128	QET41CM-107	E Cap	
C129	" -336	"	
C130	QCS11HJ-271	C Cap	
C131	" -271	"	
C132	QET41CM-336	E Cap	
C133	" -336	"	
C134	" -336	"	
C135	QFN41HK-472N	MY Cap	
C136	" -472N	"	
C137	QEN41HM-225	NP Cap	
C138	" -225	"	
C139	QCS11HJ-331	C Cap	
C140	QET41EM-335	E Cap	
C141	" -335	"	
C142	" -335	"	
C143	QET41CM-106	"	
C144	" -106	"	

Symbol No.	Part No.	Part Name	Description
C145	QET41CM-337	E Cap	
C146	QCF11HP-473	C Cap	
★C147	QET41CM-107	E Cap	
★C148	QET41EM-475	″	
C149	QET41HM-105	″	
★C150	QET41CM-106	″	
★C151	QET41HM-105	″	
C152	QET41CM-337	″	
C153	QFN41HJ-183	MY Cap	
C154	QET41CM-336	E Cap	
C155	–	–	
C156	–	–	
C157	QFN41HJ-183	MY Cap	
C158	QET41CM-336	M Cap	
★L 1	–	–	
L 2	PU51764	L.P.F.	
★L 3	A04725-6800	Peaking Coil	
★L 4	″ -5600	″	
★L 5	–	–	
L 6	PU51764	L.P.F.	
★L 7	A04725-6800	Peaking Coil	
★L 8	″ -5600	″	
★L 9	″ -820	″	
L10	A04725-5600	″	
L11	–	–	
L12	A04725-5600	Peaking Coil	
P401	PU43351-3	Cap. Housing	
★P402	″ -3R	″	
★P403	″ -4Y	″	
★P404	″ -2	″	
P405	″ -3R	″	
P406	″ -3	″	
P407	″ -103	″	
★P408	″ -3Y	″	
★P409	″ -4	″	
★P410	″ -2	″	
P411	″ -4	″	
P412	″ -4R	″	
P413	″ -2	″	
P414	″ -2R	″	
P415	″ -3	″	
P416	″ -3R	″	
P417	″ -4	″	
★P418	″ -4	″	
★P419	″ -3	″	
P420	″ -2Y	″	
P421	″ -2	″	
★RY 1	PU46682	Relay	
★RY 2	″	″	
	PU47900-3	Osc. Block	
	PU50766	Test Pin	TP1–13

★ symbol : Not used in BP-5300TR

8.5.14 Operation-A Circuit Board Ass'y $\boxed{3}\boxed{5}$

BR-6400TR PU50651A
BP-5300TR PU50651B

Symbol No.	Part No.	Part Name	Description
IC 1	M50115AP	Integrated Circuit	
★Q 1	2SD636Q,R	Transistor	
★Q 2	″	″	
D 1	SLR54UT4	LED	
D 2	″	″	
D 3	″	″	
D 4	″	″	
D 5	″	″	
D 6	″	″	
D 7	″	″	
★D 8	″	″	
★D 9	″	″	
D10	″	″	
★D11	MA150	Diode	
D12	″	″	
★D13	″	″	
R 1	QRD141K-821	CR	820 1/4 W, K
R 2	″ -821	″	820 ″ ″
R 3	″ -821	″	820 ″ ″
R 4	″ -821	″	820 ″ ″
R 5	″ -821	″	820 ″ ″
R 6	″ -821	″	820 ″ ″
R 7	″ -821	″	820 ″ ″
R 8	″ -821	″	820 ″ ″
R 9	″ -821	″	820 ″ ″
R10	″ -821	″	820 ″ ″
★R11	QRD187K-104	″	100 K 1/8 W, K
★R12	″ -104	″	100 K ″ ″
★R13	″ -104	″	100 K ″ ″
★R14	″ -104	″	100 K ″ ″
C 1	QCS11HJ-101	C Cap	100 50 V
C 2	″ -101	″	100 ″
CF 1	PU49487	Ceramic Filter	
SW 1	PU49344	Push Switch	
SW 2	″	″	
SW 3	″	″	
SW 4	″	″	
SW 5	″	″	
SW 6	″	″	
SW 7	″	″	
★SW 8	″	″	
★SW 9	″	″	
SW10	″	″	
	PU50633	LED Spacer (A)	

8.5.15 Operation-B Circuit Board Ass'y 4 4

Symbol No.	Part No.	Part Name	Description
	PU32818	Printed Board	
★VR 1	QVG4W2A-014	VR	CH-1 Level
★VR 2	" -014	"	CH-2 Level
VR 3	PU50716	"	Tracking

8.5.16 Operation-C Circuit Board Ass'y 4 3

Symbol No.	Part No.	Part Name	Description
	PU53835	Printed Board	
★R 1	QRD167J-682	CR	
★R 2	" -822	"	
	SLB-26UR5	LED	NR
	PU49536	Spacer	for LED
	PU43351-8	Connector	
SW 1	QLS2218-117	Lever Switch	NR SW
★SW 2	" -117	"	A. DUB. SEL.
★SW 3	" -117	"	INPUT SEL

★ symbol : Not used in BP-5300TR

8.5.17 Operation-D Circuit Board Ass'y 3 6

Symbol No.	Part No.	Part Name	Description
	PU50470-1-2	Printed Board	
SW 1	PU50637	Rotary Switch	VIDEO SYSTEM
SW 2	PU50639	"	MEMORY

8.5.18 Operation-E Circuit Board Ass'y 4 5

Symbol No.	Part No.	Part Name	Description
	PU50468-2	Printed Board	
SW 1	PU50637	Rotary Switch	VIDEO MODE
SW 2	"	"	
	PU43351-4	Connector	

8.5.19 Rear Circuit Board Ass'y 4 7

Symbol No.	Part No.	Part Name	Description
★R 1	QRD187J-122	CR	
★R 2	" -153	"	
★R 3	" -103	"	
★R 4	" -122	"	
★R 5	" -153	"	
★R 6	" -103	"	
R 7	–	–	
R 8	–	–	
R 9	QRD187J-101	CR	
★R10	" -750	"	
★R11	" -750	"	
	PU49486	Wire Clamp	
	SBST3006Z	TH. Tap. Screw	
	PU43192-4	Binder	
	PU46471	Aerial Connector	
	SDSP3006M	Screw	

★ symbol : Not used in BP-5300TR

8.5.20 Power Diode Circuit Board-1 Ass'y 5 2

Symbol No.	Part No.	Part Name	Description
	PU50606	Diode P.W.B.	
⚠DS5001	D5FB10-2	Diode Stack	
C5001	QCF12HP-103	C Cap	0.01 500 V
C5002	" -103	"	0.01 "
C5003	" -103	"	0.01 "
C5004	" -103	"	0.01 "

8.5.21 Power Diode Circuit Board-2 Ass'y 5 3

Symbol No.	Part No.	Part Name	Description
	PU50606	Diode P.W.B.	
⚠DS5002	D5FB10-2	Diode Stack	
C5005	QCF32HP-103	C Cap	0.01 500 V
C5006	" -103	"	0.01 "
C5007	" -103	"	0.01 "
C5008	" -103	"	0.01 "

8.5.22 Power Transistor Circuit Board Ass'y 5 4

Symbol No.	Part No.	Part Name	Description
	PU21119-1-2	P. TR. Board	
⚠ IC2001	UPC7815H	Integrated Circuit	
⚠ Q5001	2SC2484Q	P. Transistor	
⚠ Q5002	"	"	
⚠ Q5003	2SD845	"	
⚠ Q5004	2SD1128-02	"	
⚠ Q5005	2SD837Q	"	
D5001	HZ18-2L	Zener Diode	
R5001	QRD141J-222	CR	
C5009	QCF31HP-223	C Cap	
C5010	QET61HR-475	E Cap	
C5011	" -475	"	
	PU45375-4	TR. Spacer	
	PU50809	"	
	PU45375	"	
	PU53597	"	
	PU45375	"	
	PU41624-6	Isolation Washer	
	PU41624-6	"	
	PU41624-6	"	
	SDSP3012Z	Screw	
	PU43192-4	Binder	
	GBST3008Z	Tapping Screw	

8.5.23 RF Converter Mount Board Ass'y 5 7

Symbol No.	Part No.	Part Name	Description
	PU50630	RF Converter P.W.B.	
C501	QCF31HP-223	C Cap	
L501	PU49994-101	Peaking Coil	
	PU49279	Connector	
	PU51214	"	
	PU51213	BNC Connector	
	PU51438	RF Conv. Stopper	
	GBST3008Z	TH. Tap. Screw	
	SBST3006Z	"	for Stopper
	LPSP2610Z	Screw	for 45P
	LPSP2310Z	"	for 8P
	LPSP2604Z	"	
	LPSP3008Z	"	
SW 1	QSS2301-002	Slide Switch	(PB Sync.)
SW 2	" -002	"	(Audio Level)
SW 3	" -007	"	(Phones Level)
	PU48611	Ring	
	Q03093-439	Washer	
	WLS3000N	Lock Washer	
	PU53989	Jack Ass'y	BR-6400TR ONLY
	NNS3000Z	Nut	
	PU53990	Jack Ass'y	BP-5300TR ONLY

★ symbol : Not used in BP-5300TR

8.5.24 System Control Sub Board Ass'y 6 5 .... PU51772A

Symbol No.	Part No.	Part Name	Description
IC 1	UPD4584BC	Integrated Circuit	
IC 2	TC4001BP	"	
IC 3	HA17555PS	"	
IC 4	TC4011BP	"	
IC 5	M54519P	"	
D 1	1SS148	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	"	"	
D 7	–	–	
D 8	1SS148	Diode	
D 9	RD6.8EB2	Z. Diode	
D10	"	"	
D11	1SS148	Diode	
D12	"	"	
R 1	QRD167J-124	CR	120 K 1/6 W, J
R 2	" -393	"	39 K " "
R 3	" -392	"	3.9 K " "
R 4	" -124	"	120 K " "
R 5	" -392	"	3.9 K " "
R 6	" -124	"	120 K " "
R 7	" -392	"	3.9 K " "
R 8	" -392	"	3.9 K " "
R 9	" -224	"	220 K " "
R10	" -392	"	3.9 K " "
R11	" -393	"	39 K " "
R12	" -124	"	120 K " "
R13	" -564	"	560 K " "
R14	" -393	"	39 K " "
R15	" -224	"	220 K " "
R16	" -124	"	120 K " "
R17	" -333	"	33 K " "
R18	" -333	"	33 K " "
R19	" -333	"	33 K " "
R20	" -333	"	33 K " "
R21	" -222	"	2.2 K " "
R22	" -222	"	2.2 K " "
R23	" -222	"	2.2 K " "
R24	" -103		10 K
C 1	QET41HR-475	E Cap	4.7 50 V
C 2	QFN41HK-104	MY Cap	0.1 "
C 3	" -103	"	0.01 "
C 4	" -104	"	0.1 "
C 5	" -103	"	0.01 "
C 6	" -103	"	0.01 "
C 7	" -103	"	0.01 "
C 8	" -103	"	0.01 "
C 9	QET41CR-106	E Cap	10 16 V
C10	" -476	"	47 "
C11	" -476	"	47 "
C12	" -107	"	100 "
C13	QCF11EZ-102	C Cap	0.001 25 V
P651	PU43351-112	Cap Housing	

8.5.25 Power Supply Board Ass'y 7 0 ⚠PU21434A

Symbol No.	Part No.	Part Name	Description
⚠ IC 1	12VT05	Integrated Circuit	
⚠ IC 2	"	"	
IC 3	TC4011BP	"	
Q 1	2SD637S	Transistor	
⚠ Q 2	"	"	
Q 3	"	"	
Q 4	2SD638R	"	
Q 5	2SB793AR	"	
⚠ D 1	HZ7A1L	Zener Diode	
D 2	HZ12C3L	"	
D 3	HZ20-2L	"	
D 4	1SS133	Diode	
D 5	"	"	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
R 1	QRD187J-222	CR	
R 2	" -222	"	
R 3	QRX019J-R47S	MFR	
R 4	" -R47S	"	
R 5	QRD187J-821	CR	
R 6	" -102	"	
R 7	QVP4A0B-102	VR	
R 8	QRD187J-222	CR	
R 9	" -472	"	
R10	–	–	
R11	QRD187J-391	CR	
R12	" -182	"	
R13	" -102	"	
R14	" -223	"	
R15	" -102	"	
R16	" -333	"	
R17	" -333	"	
R18	" -272	"	
R19	" -472	"	
R20	" -223	"	
R21	" -333	"	
R22	" -333	"	
R23	" -333	"	
R24	" -333	"	
C 1	QFH52AM-224	MM Cap	
C 2	QEL71VR-478	E Cap	
C 3	QET61EM-107	"	
C 4	QFN31HK-123	MY Cap	
C 5	QET61EM-107	E Cap	
C 6	QFN31HK-224	MY Cap	
C 7	QFH52AM-224	MM Cap	
C 8	QCF32HP-103	C Cap	
C 9	" -103	"	
C10	–	–	
C11	QCF32HP-103	C Cap	
C12	" -103	"	
C13	QEL71VR-478	E Cap	

Symbol No.	Part No.	Part Name	Description
C14	QET61EM-107	E Cap	
C15	" -107	"	
C16	QFH52AM-224	MM Cap	
C17	QEL71HR-478	E Cap	
C18	–	–	
C19	QET61HM-105	E Cap	
C20	QET61VM-477	"	
C21	QCF31HP-222	C Cap	
C22	QET61EM-106	E Cap	
C23	QCF31HP-222	C Cap	
C24	QET61EM-106	E Cap	
	PU51212	Fuse Clip	for F3 – F10
DS-1	D5FB10-2	Diode Stack	
P715	PU43351-2	Cap. Housing	
P719	" -2Y	"	
P705	PU43351-3	Cap. Housing	
P706	" -3Y	"	
P711	PU43351-3R	Cap. Housing	
P712	" -3Y	"	
P716	" -3	"	
P717	" -3	"	
P723	" -3	"	
P708	" -6	"	
P709	" -6R	"	
P721	" -8R	"	
P722	" -8	"	
P720	" -9	"	
P718	" -4Y	"	
P724	" -4	"	
P701	A75802-5	Mini Connector	
P702	" -3	Base Connector	
P703	" -4	"	
P704	" -4	"	
	PU45908-2	Test Pin	
	V44611-002	Bus Wire	
C25	QCF11EZ-223	C Cap	
C26	" -223	"	
C27	" -223	"	

E. & O. E. No. 8254